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Service

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Draft Environmental Impact Statement Salt River Allotments Vegetative Management Project

**Globe and Tonto Basin Ranger Districts, Tonto
National Forest**

Gila County, Arizona

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Salt River Allotments Vegetative Management Project Draft Environmental Impact Statement

Gila County, Arizona

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Abstract: This draft environmental impact statement (DEIS) documents environmental analysis of the Salt River Allotments Vegetative Management Project. The project proposes reauthorization of grazing along with comprehensive vegetation management of Forest lands within six grazing allotments on Tonto Basin and Globe ranger districts of the Tonto National Forest. Alternatives analyzed include Alternative 1 No Action/No Grazing, Alternative 2 Current Management, Alternative 3 Proposed Action, and Alternative 4 Wildlife Habitat Optimization. Alternative 1 would not reauthorize grazing on allotments in the project area. Alternative 2 would maintain livestock grazing and vegetation management as currently authorized (including invasive weed treatments, fuels treatments, and prescribed fire treatment). Alternative 3 is the preferred alternative and would use desired ecological conditions for vegetative groups within the project area to set and make adjustments to grazing use, practices, and strategies, while incorporating a range of additional vegetation management tools to help move areas of concern toward desired conditions. Tools include targeted grazing strategies, fire management, fuels treatments, invasive weed treatments, and soils and vegetation restoration. Alternative 4 seeks to optimize upland and riparian habitat conditions to benefit a wide variety of wildlife species in response to comments received during scoping.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the *National Environmental Policy Act* process so that it is meaningful and alerts the agency to the reviewers' position and contentions (Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 [1978]). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement (City of Angoon v. Hodel [9th Circuit, 1986] and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 [E.D.

Wis. 1980)). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and merits of the alternatives discussed (40 CFR 1503.3).

Comments received in response to this solicitation, including names and addresses of those who comment, will become part of the public record for this proposed action. Comments submitted anonymously will be accepted and considered; however, anonymous comments will not provide the respondent with standing to participate in subsequent administrative review or judicial review.

**Send Comments to: Debbie Cress, Project Leader
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Send e-mail comments to: comments-southwestern-tonto@fs.fed.us

Date Comments Must Be Received: no later than 45 days after publication of the Notice of Availability (NOA) in the Federal Register. The publication date of the NOA in the Federal Register is the exclusive means for calculating the comment period for a proposed action documented in a draft EIS.

Summary

Salt River Allotments Vegetative Management Project encompasses 275,765 acres along the Upper Salt River on the Globe and Tonto Basin ranger districts of Tonto National Forest, Gila County, Arizona. The project area includes Chrysotile, Haystack Butte, Sedow, and Hicks/Pikes Peak allotments on Globe Ranger District; and Dagger and Poison Springs-Sierra Ancha allotments on Tonto Basin Ranger District. Action is needed because authorizations for livestock grazing on these allotments have or will soon expire and ecological conditions in some areas on these allotments have not moved towards desired conditions as outlined in the Tonto National Forest Land Management Plan. Additionally, current management plans do not contain adaptive management strategies necessary to work effectively within changing climatic conditions in the desert southwest.

Tonto National Forest proposes to improve ecological conditions within the project area using tools such as prescribed fire, fuels treatments, invasive weeds treatments, and targeted grazing management and, pursuant to Forest Service Handbook (FSH) 2209.13, Chapter 90 section 92.22 to authorize continued livestock grazing on National Forest System (NFS) lands. Livestock grazing would be authorized using adaptive management as described in this document, with monitoring and mitigation measures designed to improve resource conditions. Vegetation management tools would be implemented in compliance with mitigation measures described in this document to minimize undesirable effects and promote attainment of desired conditions.

In addition to the proposed action, the Forest Service also evaluated the following alternatives: No Action/ No Grazing, Current Management, and Wildlife Habitat Optimization.

In 1995, Congress passed Public Law 104-19, commonly known as the *Rescissions Act*. This Act directed the Forest Service to develop and implement a schedule for completing environmental analyses under the *National Environmental Policy Act* (NEPA) on all grazing allotments. In response to the Act, Tonto National Forest published a Notice of Intent to prepare an EIS in the Federal Register in June 2011. In compliance with Forest Service Handbook 2209.13, Chapter 90, section 92.22, the purpose of this action is to authorize livestock grazing and other vegetation management tools in a manner consistent with Forest Plan direction to move ecosystems towards their desired conditions. This EIS analyzes effects of reauthorizing livestock grazing and other vegetation management tools within the project area.

The Proposed Action was developed through collaboration with affected grazing permittees, published in local newspapers and sent to approximately 2,000 members of the public, Tribes, and other agencies. Comments received were considered for development of additional alternatives. Issues which were raised and led the agency to develop alternatives to the proposed action included: impacts from livestock grazing to recreational activities; impacts from livestock grazing to riparian areas; impacts from livestock grazing to soils and upland vegetation; and impacts from livestock grazing to wildlife species.

Based upon effects of the alternatives, responsible officials will decide whether, and in what manner, to reauthorize grazing in concert with a variety of vegetation management tools described in this analysis.

Globe and Tonto Basin district rangers are the responsible officials for this decision and will issue decision notices documented in a Record of Decision. Implementation of decisions would occur through allotment management plans, annual operating instructions, and burn plans as required. These plans would include management actions, mitigation measures, and monitoring requirements necessary to the decisions. These documents would also describe permitted numbers

of animals, season of use, allowable utilization standards, terms of grazing permits, and prescribed fire implementation boundaries.

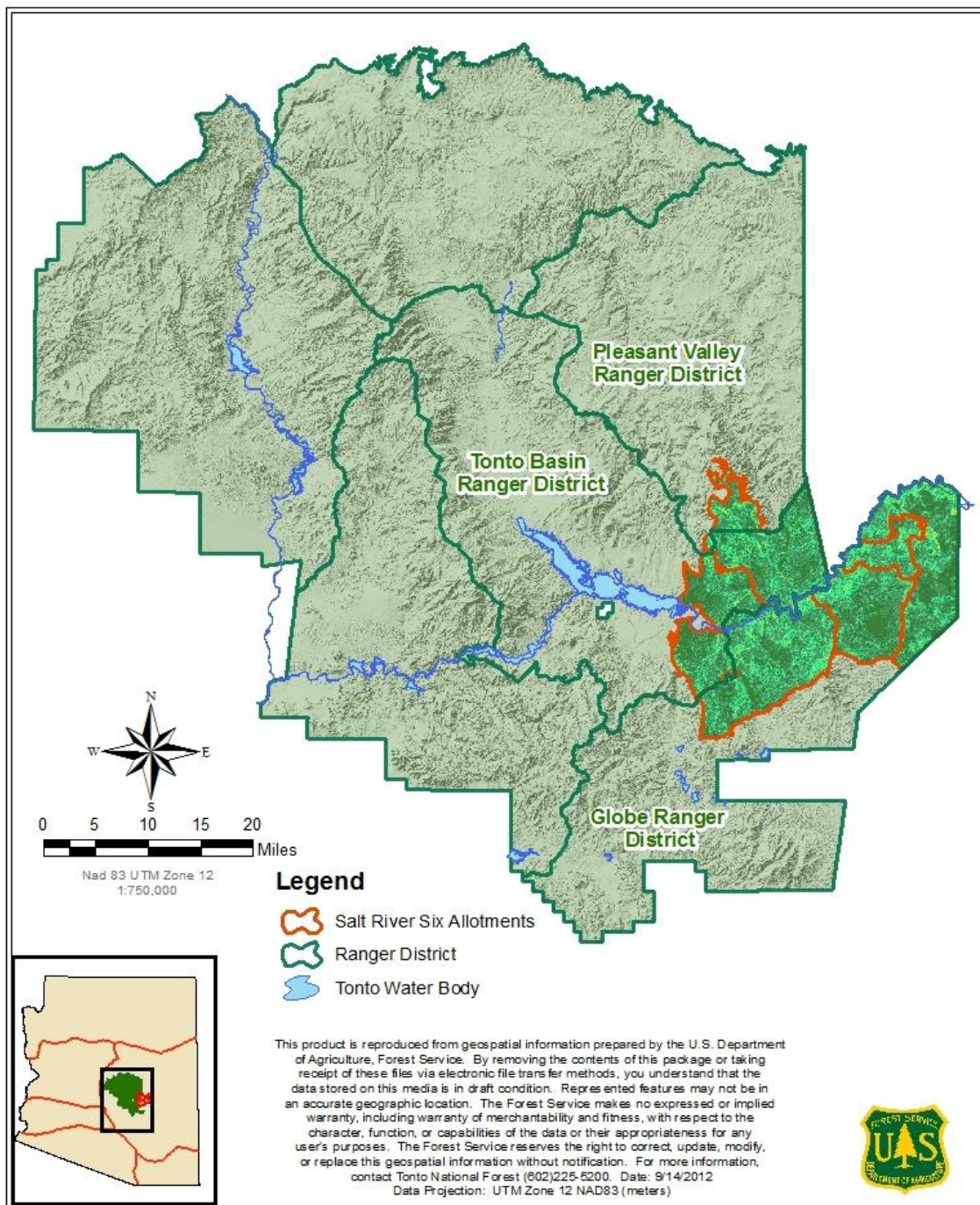


Figure 1- Map Showing Vicinity of Project Area

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Chapter 1: Purpose Of and Need for Action

Document Structure

The Forest Service has prepared this draft Environmental Impact Statement in compliance with the *National Environmental Policy Act* (NEPA) and other relevant Federal and State laws and regulations. This draft Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

Chapter 1: Purpose and Need for Action: includes information on the history of the project proposal, purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Chapter 2: Alternatives, including the Proposed Action: provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides summary tables of environmental consequences associated with each alternative.

Chapter 3: Affected Environment and Environmental Consequences: describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area.

Chapter 4: Consultation and Coordination: provides a list of preparers and agencies consulted during the development of the environmental impact statement.

Appendices: provide more detailed information to support the analyses presented in the environmental impact statement.

Index: provides page numbers by document topic.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at Tonto National Forest Supervisor's Office, 2324 E. McDowell Rd., Phoenix, AZ 85006.

Background

The Salt River Allotments Vegetative Management project area (project area) encompasses 275,765 acres along Upper Salt River on Globe and Tonto Basin ranger districts of the Tonto National Forest, Gila County, Arizona. The project area includes 52 miles of Upper Salt River; an undammed, free-flowing whitewater river enjoyed by thousands of recreational river runners each year and home to threatened, endangered and sensitive (TES) wildlife species. Salt River Wilderness, Sierra Ancha Wilderness, and Upper Salt River Canyon are unique management areas included in boundaries for this project area and contain numerous hiking trails and outdoor recreation opportunities.

The project area includes Chrysotile, Haystack Butte, Sedow and Hicks-Pikes Peak allotments on Globe Ranger District; and Dagger and Poison Springs-Sierra Ancha allotments on Tonto Basin Ranger District. Poison Springs and Sierra Ancha Allotments have been grazed together since the late 1940s. In 2009 lands within Sierra Ancha Allotment were divided between Dagger Allotment and Poison Springs Allotment. These six allotments overlap five management areas established in the Tonto National Forest Land and Resource Management Plan (Forest Plan), as amended (U.S.

Forest Service 1985). Within the Forest Plan, these management areas are identified as 2B, 2C, 2F, 5A, 5D, 5E, 5F, 6F, 6G, and 6J.

For over a century, ranchers have used lands in the project area for cattle and sheep grazing. People and communities associated with ranching operations have been an integral part of life in this area. When the Forest Service was established in the western United States, domestic livestock were already grazing the project area. Reduced vegetation cover and soil erosion occurred in many places as a result of concentrated livestock use and drought conditions. Initially, grazing permits were based on the number of livestock these first ranchers grazed. With very few fences present on the landscape, livestock followed the most palatable forage wherever it occurred.

Over time, domestic livestock management has evolved as more information on the effects of livestock grazing has become available. In addition to permitting manageable, resource and landscape-appropriate herd sizes, grazing systems that incorporate an element of vegetative rest have been implemented. Current management also incorporates fencing, herding, salting, rotational grazing, and water development to distribute livestock and provide periodic rest to vegetation and water resources. Current resource conditions demonstrate significant improvement over historic conditions. Chapter 3 provides an expanded description of current vegetative condition in relation to livestock grazing.

The project area has experienced numerous, relatively small wildland fires in all vegetation types to varying degrees, affecting plant composition and soil conditions at a local scale. Current conditions show that most vegetation types are somewhat departed from their historic fire return intervals. Prescribed burning has been accomplished through implementation of burn plans for relatively small areas with an identified management need.

Chapter 3 provides an expanded description of current fuel conditions in relation to past and present actions in the project area.

Limited vegetative treatments, including mechanical fuel treatments and noxious weed treatments have occurred in the project area at small, isolated locations. Chapter 3 provides an expanded description of noxious weeds and fuels treatments and their locations.

History of the Analysis

In 1995, Congress passed Public Law 104-19, commonly known as the *Rescissions Act*. This Act directed the Forest Service to develop and implement a schedule for completing environmental analyses under NEPA on all grazing allotments. Since the passage of the *Rescissions Act*, Congress has provided additional direction concerning grazing permits in several appropriations bills, including the *2004 Interior Appropriations Act* (PL 108-108), Section 325. This section of the Act does not require adherence to original allotment NEPA schedules and provides the Forest Service with the discretion to periodically update allotment NEPA schedules and reprioritize allotments that will be analyzed based on emerging environmental issues and available funding. In response to the *Rescissions Act*, the Tonto National Forest published a Notice of Intent to prepare an EIS for the project area in the Federal Register in June 2011. This EIS analyzes effects of reauthorizing livestock grazing within the project area along with a suite of additional vegetation management tools.

All allotments border Upper Salt River. Perennial water that supports vegetation and wildlife, and a remote, wild, non-motorized setting characterize much of the Salt River Canyon area. A Wild and Scenic River Study Report and Environmental Impact Statement for the Salt River (U.S. Forest Service 1982) recommended “wild designation of 22 miles of the Salt River as a component of the National Wild and Scenic Rivers System” (NWSR). This segment of river, from Lower Corral Canyon to the Highway 288 Bridge, remains eligible for inclusion in the NWSR system.

Recreationists come to Salt River Canyon for a wide variety of recreation opportunities including whitewater rafting, kayaking, canoeing, swimming, fishing, hiking, camping, horseback riding, mountain biking, picnicking, wildlife viewing, hunting, target shooting, Off-Highway Vehicle (OHV) use, and scenic driving. Additional characteristics that add value to this recreation setting include challenging river rapids, spectacular scenery, dramatic geology, natural salt deposits, archaeological sites, lush stream and river vegetation, and perennial side streams.

The 32,100 acres of land that comprise the Salt River Canyon Wilderness were incorporated into the National Wilderness Preservation System in 1984. Although backpackers sometimes access the river by hiking down side creeks, there are no system trails in Salt River Canyon Wilderness, so recreational access is primarily accomplished by whitewater boating.

In 1997, a group of plaintiffs filed a lawsuit citing Forest Service decisions to graze livestock in Salt River corridor (along with other allotments on other forests) were violating the *Endangered Species Act* with regard to native fish populations and possibly Southwestern willow flycatcher because formal consultation had not been completed. In 1998, the Forest Service and U.S. Fish and Wildlife Service entered into a Grazing Consultation Agreement to complete Section 7 consultation for allotments and species listed in litigation. The litigation was then suspended and grazing consultation was completed in 1999, resulting in a no-grazing decision along Salt River until site-specific analysis was completed.

A recovery plan for Southwestern willow flycatcher, an endangered species, was finalized in 2002. This plan did not prohibit livestock grazing in flycatcher habitat along Salt River; however, it stated that recovery of flycatchers would be most likely in the shortest amount of time with total exclusion of livestock grazing from the river corridor. Because subsequent Biological Opinions issued by U.S. Fish and Wildlife Service generally concur with “not likely to adversely affect” determinations in the absence of livestock grazing and generally do not concur with decisions where livestock are proposed to graze, the Forest Service denied a 2005 request to incorporate winter grazing along Salt River on Hicks Pikes-Peak Allotment until a comprehensive analysis and formal consultation was completed.

Purpose and Need for Action

The purpose of this effort is to continue improving ecological conditions within the project area using tools such as prescribed fire, fuels treatments, invasive weeds treatments, and targeted grazing management in order to meet desired future conditions as specified in the Forest Plan while balancing multiples uses. In addition, per Forest Service Handbook (FSH) 2209.13, Chapter 90, section 92.22, the purpose of this action is to authorize livestock grazing in a manner consistent with Forest Plan direction to move ecosystems towards their desired conditions using adaptive management techniques.

Six authorizations for livestock grazing have expired or will soon expire and ecological conditions in some areas on these allotments have not moved towards goals and objectives as outlined in the Forest Plan as summarized below and in chapter 3. In addition, knowledge and strategies for ecosystem management have changed over time, providing an opportunity to improve vegetative conditions using current science, methods, and strategies. Current allotment management plans do not meet operational needs of all permittees and are not flexible enough to respond to changing environmental conditions. As a result, there is a need to develop new grazing management strategies for ecosystems within the six allotments along the Salt River. There is also a need to incorporate tools in addition to grazing that would provide expanded opportunities to move vegetation toward desired conditions in the project area.

Where consistent with other multiple use goals and objectives, there is Congressional intent to allow grazing on suitable lands through the *Multiple Use Sustained Yield Act of 1960*, *Wilderness Act of 1964*, *Forest and Rangeland Renewable Resources Planning Act of 1974*, *Federal Land Policy and Management Act of 1976*, and *National Forest Management Act of 1976*.

The six allotments in the project area contain lands identified as suitable for domestic livestock grazing in the Forest Plan and continued domestic livestock grazing is consistent with goals, objectives, standards, and guidelines of the Forest Plan as described in this document. Tools proposed for vegetation management are consistent with goals, objectives, standards, and guidelines of the Forest Plan as well.

Management Goals and Objectives

Management Area 2B Salt River Canyon Wilderness (appendix A, map 2)

The primary emphasis for this area is the preservation of naturally occurring flora, fauna, aesthetics, and ecological processes while providing a very high quality white water river running experience. Special consideration is be given to nesting bald eagle home range requirements. Watershed protection is also an important emphasis, and the stream shall be maintained in a free-flowing condition with water quality maintained or improved. Other activities that are authorized by the *Wilderness Act* will be conducted so as to minimize their impact on wilderness character.

Wildland fire is managed to protect, maintain, and enhance federal lands in a cost effective manner consistent with wilderness resource objectives. Naturally occurring fires may be used to play, as nearly as possible, their natural ecological role and to reduce unnatural fuel hazards as identified in Forest Service Manual and approved Wilderness Implementation Plan.

Management Area 2C Upper Salt River

The primary emphasis for this area is preservation of naturally occurring flora and fauna, and esthetic values while providing a very high quality white-water, river-running experience. Special consideration will be given to nesting bald eagle home range requirements. Watershed protection is also an important emphasis, and the stream is maintained in a free-flowing condition with water quality maintained or improved. Other activities will be authorized, so long as they are consistent with primary management emphasis for this river and adjacent lands.

Wildland fire will be managed consistent with resource objectives. Wildland fire will be managed with an appropriate suppression response. Fire management objectives for this area include: providing a mosaic of age classes within the total type which would provide for a mix of successional stages, and to allow fire to resume its natural ecological role within ecosystems.

Wildland fires or portions of fires will be suppressed when they adversely affect forest resources, endanger public safety, or have a potential to damage capital investments.

***Management Area 2F General Management Area – Globe Ranger District and
Management Area 6J General Management Area – Tonto Basin Ranger District***

This area's emphasis is to manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, water quality maintenance, livestock forage production, and dispersed recreation. Watersheds will be managed to improve them to a satisfactory or better condition. Improve and manage the included riparian areas to benefit riparian dependent resources.

Wildland fire is managed to protect, maintain, and enhance federal lands in a cost effective manner. A combination of wildfire and prescribed fire may be used to provide a mosaic of age classes and a mix of successional stages within fire-dependent ecosystems. Wildfires, or portions of those fires, are suppressed when they adversely affect forest resources, endanger public safety, or have potential to damage property and natural/cultural resources. Sonoran Desert and riparian vegetation types are protected from fire except where burn plans identify resource and ecological needs.

A variety of fuels management techniques may be used to reduce natural and activity fuels to condition class 1 (i.e., fire regime within historic range and vegetation composition, function, and structure are within normal range), including fuel wood harvesting, chipping, pile and burn, and broadcast burning.

Management Area 5A Sierra Ancha Wilderness

Management emphasis is for wilderness values, wildlife habitats, and natural ecological processes while allowing livestock grazing and recreation opportunities that are compatible with maintaining these values and processes.

Wildland fire will receive an appropriate management response and be managed consistent with wilderness resource objectives. Naturally occurring fires may be used to play as nearly as possible their natural ecological role and to reduce unnatural fuel hazards as identified in the Forest Service Manual and approved Wilderness Implementation Plan.

Management Area 5D Mogollon Rim-Sierra Ancha Area

Manage for a variety of renewable resource outputs with primary emphasis on intensive, sustained yield timber management, timber resource protection, creation of wildlife habitat diversity, increased populations of emphasis harvest species, and recreation opportunity. Timber harvesting methods and timing will include improvement of wildlife habitat quality and watershed condition, and will consider impacts on intensive range and recreation management.

Wildland fires will be managed consistent with resource objectives. Wildland fires will be managed with an appropriate suppression response. Fire management objectives for this area include: providing a mosaic of age classes within the total type which will provide for a mix of successional stages, and to allow fire to resume its natural ecological role within ecosystems. Wildland fires or portions thereof will be suppressed when they adversely affect forest resources, endanger public safety, or have a potential to damage significant capital investments.

Management Area 5E- Sierra Ancha Experimental Forest

The Experimental Forest was established and is managed for purposes of research on vegetative treatments for increasing water yield.

Wildland fires will be managed consistent with resource objectives. Wildland fires will be managed with an appropriate suppression response. Fire management objectives for this area include: providing a mosaic of age classes within the total type which will provide for a mix of successional stages, and to allow fire to resume its natural ecological role within ecosystems. Wildland fires or portions thereof will be suppressed when they adversely affect forest resources, endanger public safety, or have a potential to damage significant capital investments.

Management Area 5F- Proposed Upper Forks Parker Creek Research Natural Area

Manage to provide opportunities for non-disruptive research and education. Use restrictions will be imposed as necessary to keep areas in their natural or unmodified condition. There will be no harvest of forest products, including fuel wood.

Wildfires outside the natural area which endanger the area will be extinguished in an appropriate manner as will person-caused fires within the area. Unplanned ignitions within the area will receive appropriate suppression action.

Management Area 6F- Roosevelt and Apache Lakes Recreation Area

The primary emphasis for this area is water-oriented developed and dispersed recreation. Capacity controls will be established where needed to protect soil and water resources and public health and safety. Recreation sites in this management area will emphasize a mix of day use and overnight use. The visual resource is an important consideration in the management of this area.

Wildland fires will be managed consistent with resource objectives. Wildland fires will be managed with an appropriate suppression response. Fire management objectives for this area include: providing a mosaic of age classes within the total type which will provide for a mix of successional stages, and to allow fire to resume its natural ecological role within ecosystems. Wildland fires or portions thereof will be suppressed when they adversely affect forest resources, endanger public safety, or have a potential to damage significant capital investments.

Management Area 6G - Salt River Canyon Wilderness

The primary emphasis for this area is the preservation of naturally occurring flora and fauna, esthetics and ecological processes while providing a very high quality white-water river-running experience. Special consideration will be given to meeting bald eagle home range requirements. Watershed protection is also an important emphasis, and the stream shall be maintained in a free-flowing condition with water quality maintained or improved. Other activities that are authorized by the *Wilderness Act* will be conducted so as to minimize their impact on wilderness character.

Wildland fire will receive an appropriate management response and be managed consistent with wilderness resource objectives. Naturally occurring fires may be used to play as nearly as possible their natural ecological role and to reduce unnatural fuel hazards as identified in the Forest Service Manual and approved Wilderness Implementation Plan.

Proposed Action

The Tonto National Forest proposes to use a set of tools that lessen or eliminate disparities between existing conditions and desired conditions in the project area. Examples of tools that

land managers may use to accomplish this include, but are not limited to, livestock grazing, prescribed fire, integrated pest management, mechanical vegetative removal, and seeding. The proposed action includes an adaptive management strategy that allows land managers to be flexible enough to make timely decisions relative to a host of ever changing environmental conditions (36 CFR 220.3). This proposed action focuses on entire ecosystem potential rather than a subordinate role of a single resource use or activity within analysis area ecosystems.

Since one tool under consideration for executing the proposed action is grazing, Globe and Tonto Basin ranger districts, in collaboration with grazing permittees, propose to reauthorize livestock grazing on six allotments; Chrysotile, Haystack Butte, Sedow, Hicks-Pikes Peak, Dagger and Poison Springs. Livestock grazing, as an ecosystem tool, would provide yearlong application utilizing various age classes of cattle on each allotment. Grazing would continue to comply with the Forest Plan, which provides direction for grazing using various management levels in five management areas on these two districts. Grazing practices would comply with national and regional policy and direction (FSM 2200, FSH 2209.13) and would incorporate adaptive management strategies (FSH 2209.13 Chapter 90) to optimize forage production where appropriate and benefit a variety of natural resources and multiple use objectives in ecosystems ranging from grassland to forest.

Conditions are highly variable in the analysis area ecosystems due to historically dynamic climatic regimes in the desert southwest and globally changing climate conditions. Production of palatable forage and browse for livestock and wildlife varies greatly both seasonally and annually. Through adaptive management strategies, this proposed action strives to respond to change by utilizing a variety of tactics, which may include but are not limited to, flexible stocking rates, vegetation manipulation, and water development.

Authorized numbers would initially begin with current stocking rates, provided those rates are supporting progress of existing condition toward desired condition for each resource as determined through this analysis. Where current stocking rates are not supporting progress of existing condition toward desired condition, temporary reductions may be necessary. Authorized numbers, season of use, and class of domestic grazing animal would be determined annually through operating instructions for each allotment. Authorized numbers would be based on allotment management plans and goals, accounting for existing condition of climate, vegetation, soils, streams, heritage, and wildlife, including precipitation amounts and patterns and utilization measurements. Authorized numbers could increase or decrease over time as monitoring data for each resource is gathered and analyzed, and would not exceed upper stocking limits for Tonto National Forest (FSH 2209.13). Data for determining stocking would be gathered throughout each grazing season using a variety of monitoring techniques as described in agency manuals and handbooks as well as through scientific literature produced through other agencies, research stations, and universities.

Rangeland allotment infrastructure includes, but is not limited to, forms of improvements such as fences, water wells, spring developments, storage tanks, pipelines, and watering troughs. Additionally, each allotment has proposed a variety of new range improvements to be constructed for facilitation of livestock distribution to accomplish ecosystem objectives.

Additional management tools, including but not limited to, wildfire, prescribed fire and noxious weed treatments are proposed for use to benefit forage and browse production and other resource objectives. Globe and Tonto Basin ranger districts also propose use of fuels management

techniques on these allotments as authorized through the Forest Plan, to allow wildfire to resume its natural ecological role in fire dependent ecosystems. Wildland fire would be managed to protect, maintain, and enhance federal land resources in a cost effective manner. A combination of wildfire and prescribed fire may be used to provide a mosaic of age classes and a mix of successional stages within fire-dependent ecosystems.

Decision Framework

Tonto Basin and Globe District Rangers are the officials responsible for the decision regarding management of allotments in this analysis. As a result of this analysis process, the District Rangers will issue a decision notice as to whether or not livestock grazing would continue to be authorized, and in what manner. Implementation of a decision to continue to authorize livestock grazing would occur through an allotment management plan and annual operating instructions. These would include any management actions, mitigation measures, and monitoring requirements necessary to the decision. These documents would also describe permitted numbers of animals, season of use, allowable utilization standards, and terms of each grazing permit.

Public Involvement

District range personnel met with individual permittees throughout 2010 and 2011 to collect data and receive input on the proposed action. Notice of Intent (NOI) was published in the Federal Register on June 2, 2011. The NOI asked for public comment on the proposal from June 2, 2011 to July 5, 2011. The agency published Legal Notices of the Proposed Action with an opportunity to comment in the Arizona Silver Belt on June 8, 2011 and Payson Roundup on June 3, 2011.

In addition, the proposed action with an opportunity to comment was sent in a scoping letter to nearly 2,000 individuals, including permittees, federal, state, and local agency representatives, tribal representatives, environmental agency representatives, and other interested parties. These actions generated 35 responses which were reviewed by the interdisciplinary team. A summary of these responses can be found at appendix G.

Using these comments along with input from Forest Service specialists, a list of issues was developed during a content analysis meeting and alternatives to the proposed action were drafted. A meeting was held with grazing permittees to discuss comment letters and results of the content analysis meeting. A meeting was held with Arizona Game and Fish Department to clarify comments made by that agency during scoping. A follow-up meeting was held with grazing permittees to answer a variety of questions that arose following development of alternatives. Permittees requested and were provided items from the project record during analysis. Permittees requested and were granted Applicant Status with U.S. Fish and Wildlife Service (USFWS) for consultation on the Biological Assessment prepared in support of this EIS.

Issues

The Forest Service separated issues into two groups: significant and non-significant issues. Significant issues are defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues are identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)...." A list of non-

significant issues and reasons regarding their categorization as non-significant may be found in the project record.

The Forest Service identified the following significant issues during scoping which will be addressed in chapter 3 of this document:

Issue #1: Recreation and Visual

- ***Issue:*** There is a concern that livestock grazing along the Salt River Corridor and within the Salt River Wilderness conflict with recreation users and does not support wilderness values.
- ***Indicator:*** Limits of acceptable change determined by Backcountry Campsite Evaluation Inventory as outlined in the Salt River Corridor Wilderness Implementation Plan.

Issue #2: Riparian Areas and Biodiversity

- ***Issue:*** There is a concern that livestock grazing in riparian areas creates undesirable impacts to riparian vegetation and stream channel function and may compromise essential habitat for Threatened, Endangered and Sensitive wildlife species. There are also concerns that cattle impacts degrade water quality.
- ***Indicator:*** Number of riparian areas grazed. For federally listed species and Forest Sensitive species: a determination of "no effect," "may affect, not likely to adversely affect," or a "may affect, likely to adversely affect."

Issue #3: Soils and Vegetation

- ***Issue:*** There is a concern that soils in some areas, such as Sonoran Desert and semi-desert grasslands, are in unsatisfactory or impaired condition and would not improve with continued livestock grazing.
- ***Indicator:*** For vegetation, utilization/condition class of key vegetative areas. Acres of impaired and unsatisfactory soils and a qualitative assessment of the likelihood for improvement are used for soils.

Other Related Efforts

There are no other related efforts being conducted that would affect the proposed action or the decision to be made for this project.

Chapter 2: Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares alternatives considered for the project area. It includes a description of each alternative considered. This section also presents alternatives in comparative form, sharply defining differences between each alternative and providing a clear basis for choice among options by decision makers and the public. Some information used to compare alternatives is based upon design of the alternative (e.g., seasonal versus yearlong grazing) and some information is based upon environmental, social and economic effects of implementing each alternative.

Alternatives Considered in Detail

The Forest Service developed four alternatives, including No Action/No Grazing, Current Management, Proposed Action, and Wildlife Habitat Optimization in response to the purpose and need of the project and issues raised by agency personnel and members of the public.

Alternative 1- No Action/ No Grazing

Under this alternative term grazing permits on all six allotments within the project area would be cancelled following guidance in 36 CFR 222.4 and FSM 2231.62. Existing improvements no longer functional or needed for other purposes, including interior fences, cattle guards, and water developments would be evaluated for continued usefulness and removed as necessary.

Alternative 2 - Current Management

Livestock grazing would continue as it is now permitted on the Chrysotile, Haystack Butte, Sedow, Hicks/Pikes Peak, Dagger and Poison Spring allotments (appendix A, maps 3 through 3g). Management systems, numbers of animals, and season of use would remain the same under this alternative. Existing standards and guidelines in the Forest Plan, as well as current allotment management plans (AMPs), would continue to guide grazing activity within the project area. None of the improvements listed in the proposed action would be implemented to accomplish project goals unless they are already addressed in current AOIs. Mitigation measures would be the same as those identified in the current Forest Plan and AMPs for each allotment.

Chrysotile, Haystack Butte, Sedow and Hicks Pike Peak allotments would continue to be managed following the current plan of yearlong grazing under a rest rotation system. Each pasture would be given a growing season of rest at least once every other year. Due to resource concerns along Salt River, livestock grazing in pastures adjacent to Salt River would either not be used or would be managed to keep livestock from accessing the river.

Chrysotile Allotment would continue to graze up to 228 cattle and 115 yearlings rotating yearlong through authorized pastures. The following pastures would not be used: North Ash Creek, Ash Creek, Ash Creek Riparian, Gleason Holding, and Gleason Riparian. Management and natural barriers in Regal, Boundary and 72 pastures prevent livestock from accessing Salt River.

Haystack Butte Allotment would continue to graze up to 184 cattle, 52 yearlings and 10 horses rotating through all pastures. Fences and other barriers in Cottonwood and River pastures are intended to prevent livestock from accessing Salt River.

Sedow Allotment would continue to graze up to 528 cattle, 198 yearlings and 8 horses rotating through all pastures. There are no grazed areas on Sedow Allotment along Salt River.

Hicks-Pikes Peak Allotment would continue to graze up to 1000 cattle and 262 yearlings rotating through authorized pastures. Ortega and Lower Shute pastures would not be used. Natural barriers and fences around Upper Shute pasture prevent livestock access to Salt River.

Dagger and Poison Spring allotments would continue to be managed following the current plan of yearlong grazing using a deferred rotation grazing system. There would be no new improvements other than those currently listed in the AOIs. Each pasture would receive rest at a different time each year. Livestock grazing in pastures adjacent to Salt River would either not be used or would be managed to keep livestock from accessing the river.

Dagger Allotment would continue to graze up to 125 cattle plus 10 horses rotating through 6 of the 11 pastures. Two would not be grazed until scheduled improvements are completed. Dagger, West Devore and Lower Dry Creek would not be used, and the upper portion of Oak Creek Mesa Pasture in the Sierra Anchas would not be used.

Poison Springs would continue to graze up to 112 cattle through 10 of the 17 pastures. West Highway, Bassett Lake, Intake, Summit, Blevens, Upper Blevens, and Klondike pastures would not be used because of concerns with impaired soils, limited vegetation, access, and historic livestock distribution.

Alternative 3 - Proposed Action

Livestock grazing would continue yearlong (with periodic rotational rest of individual pastures) using various age classes of cattle on each allotment. Through adaptive management strategies, this proposed action would respond to change by utilizing a variety of tactics, which may include but are not limited to, flexible stocking rates, vegetation manipulation, and water development (maps 4a-4f).

Authorized numbers would initially begin with current stocking rates, provided those rates are supporting progress of existing condition toward desired condition for each resource as determined through this analysis. Where current stocking rates are not supporting progress of existing condition toward desired condition, temporary reductions may be necessary. Authorized numbers, season of use, and class of domestic grazing animal would be determined annually through operating instructions for each allotment. Authorized numbers would be based on existing condition for climate, vegetation, soils, streams, heritage, and wildlife, including precipitation amounts and patterns and utilization measurements. Authorized numbers could increase or decrease over time as monitoring data for each resource is gathered and analyzed, and would not exceed upper stocking limits for the Tonto National Forest (FSH 2209.13). Data for determining stocking would be gathered throughout each grazing season using a variety of monitoring techniques as described in agency manuals and handbooks as well as through scientific literature produced through other agencies, research stations, and universities.

Rangeland allotment infrastructure includes, but is not limited to, improvements such as fences, water wells, spring developments, storage tanks, pipelines, and watering troughs. Presently, these improvements range in condition from excellent to poor. All improvements listed in permits would be maintained to Forest Service standard (U.S. Forest Service 1985). Those in poor condition are considered a priority for improvement through this proposed action. Additionally, each allotment proposes a variety of new range improvements to be constructed to facilitate livestock distribution to accomplish ecosystem objectives. Only those improvements determined through this analysis to be necessary for proper management of resources and livestock within the

project area would be authorized. Improvements for the convenience of the permittee and which do not contribute to betterment of range would not be constructed (FSM 2240.3). Additional improvements that may be needed through the lifetime of this decision to provide for resource benefit would be analyzed separately before being implemented.

Additional management tools, including but not limited to, wildfire, prescribed fire and noxious weed treatments are proposed for use to benefit forage and browse production and other resource objectives. Fuels management techniques on these allotments, as authorized through the Forest Plan, would allow wildfire to resume its natural ecological role in fire dependent ecosystems. Wildland fire would be managed to protect, maintain, and enhance federal lands in a cost effective manner. A combination of wildfire and prescribed fire may be used to provide a mosaic of age classes and a mix of successional stages within fire-dependent ecosystems. Invasive weed treatments would be used to increase native plant diversity across the landscape. Herbicide application would be conducted in compliance with the Tonto NF Environmental Assessment for Integrated Treatment of Noxious or Invasive Weeds (August 2012).

Table 1: Proposed Vegetation Management Tools

	Riparian	Sonoran Desert	Semi-desert Grasslands	Juniper Savannahs	Juniper Woodlands	Turbinella Oak Chaparral	Conifer Forests
Light to conservative grazing	Incidental	X	X	X	X	X	X
Grazing/browsing to reduce seed propagation of nonnative plants		X	X	X	X	X	X
Short duration/ high intensity grazing system		X	X	X	X	X	X
Fencing/herding	X	X	X	X	X	X	X
Water development	Offsite to reduce incidental grazing	X	X	X	X	X	X
Erosion control structures	X	X	X	X	X	X	X
Seeding/ planting native vegetation in recovering soils	X	X	X	X	X	X	X
Salt and or low moisture blocks to distribute livestock across landscape		X	X	X	X	X	X

	Riparian	Sonoran Desert	Semi-desert Grasslands	Juniper Savannahs	Juniper Woodlands	Turbinella Oak Chaparral	Conifer Forests
Mechanical and fire treatments to remove noxious weeds and invasive plants	Limited, site specific application of fire	X	X	X	X	X	X
Timber/fuel wood treatments					X	X	X
Use of managed or wildland fire		X	X	X	X	X	X

Chrysotile Allotment

Permittees for Chrysotile Allotment propose to graze yearlong with a cow/ calf herd of up to 525 adult cattle using a deferred rotation grazing strategy. Calves from the herd would be grazed from January through May (estimated 300 head). The permittee proposes to graze cattle in addition to their core herd when adequate forage is available. The intent of their grazing strategy is to conservatively stock the allotment with a core herd and supplement with additional cattle when forage is available to maximize the economic viability of their operation, while protecting and improving resource conditions.

Proposed range improvements include the following:

- Poverty Pasture - Construct 1.5 miles of fence to divide the pasture into two units.
- Poverty Pasture - Reduce density of juniper trees using tools proposed in table 01.
- Poverty Pasture- Use prescribed fire to manage invasive species and brush.
- Timber Camp Pasture - Construct 3 miles of fence to divide the pasture into two units.
- Timber Camp Pasture - Drill a well, install a solar pumping plant, four miles of pipe line, a 10,000 gallon storage tank, and six troughs to improve livestock distribution and provide permanent water.
- Timber Camp Pasture - Reduce density of juniper trees using tools proposed in table 01.
- Timber Camp Pasture - Use prescribed fire to manage invasive species and brush.
- Carol Pasture, Hicks Trap - Drill a well, install a solar pumping plant, 1.5 miles of pipeline, a 10,000 gallon storage tank, and two troughs to improve livestock distribution and provide permanent water.
- Carol Pasture, Carol Spring - Drill a well, install a solar pumping plant, five miles of pipeline, two 10,000 gallon storage tanks, and seven troughs to improve livestock distribution and provide permanent water.
- Carol Pasture, Barrow Pit - Drill a well, install a solar pumping plant, four miles of pipeline, two 10,000 gall storage tanks, and six troughs to improve livestock distribution and provide permanent water.
- Carol Pasture - Construct four miles of fence to divide pasture into two units.
- Carol Pasture - Reduce density of juniper and pine trees using tools proposed in table 01.
- Carol Pasture - Use prescribed fire to manage invasive species and brush.
- Carol Pasture - Construct two dirt stock tanks with fencing for livestock traps to improve operation efficiency and facilitate timely pasture rotation.

- Tony Pasture - Drill a well to supply water to an existing pipeline and troughs and install a solar pumping plant.
- Tony Pasture, West Tony - Drill a well, install a solar pumping plant, four miles of pipeline, 10,000 gallon storage tank, and six troughs.
- Tony Pasture - Construct four miles of fence to divide pasture into two units.
- Tony Pasture - Reduce density of juniper trees using tools proposed in table 01.
- Tony Pasture - Use prescribed fire to manage invasive species and brush.
- Tony Pasture - Construct a new corral in West Tony.
- 72 Pasture, North 72 - Drill a well, install solar pumping plant, 4.5 miles of pipeline, a 10,000 gallon storage tank, and six troughs to improve livestock distribution and provide permanent water.
- 72 Pasture, South 72 - Drill a well, install solar pumping plant, 4.5 miles of pipeline, a 10,000 gallon storage tank, and six troughs to improve livestock distribution and provide permanent water.
- 72 Pasture - Construct four miles of fence to divide pasture into two units.
- 72 Pasture - Reduce the density of juniper trees using tools proposed in table 01.
- 72 Pasture - Use prescribed fire to manage invasive species and brush.
- Regal Pasture- Drill a well to supply water to an existing pipeline and troughs. Install a solar pumping plant and 10,000 gallon storage tank.
- Regal Pasture, South Regal - Drill a well, install a solar pumping plant, three miles of pipeline, a 10,000 gall storage tank, and four troughs.
- Regal Pasture - Construct four miles of fence to divide pasture into two units.
- Regal Pasture - Construct two dirt tanks with fencing for livestock traps to improve operation efficiency and facilitate timely pasture rotation.
- Regal Pasture - Reduce the density of juniper trees using tools proposed in table 01.
- Regal Pasture - Use prescribed fire to manage invasive species and brush.
- Gleason Pasture - Add 1.5 miles to existing pipeline with two additional troughs.
- Gleason Pasture - Construct four miles of fence to divide pasture into two units.
- Gleason Pasture - Reduce the density of juniper trees using tools proposed in table 01.
- Gleason Pasture - Use prescribed fire to manage invasive species and brush.
- Ash Creek Pasture - Add four miles to existing pipeline along with an 8,000 gallon storage tank and five troughs.
- Ash Creek Pasture - Rebuild existing corrals.
- Ash Creek Pasture - Reduce the density of juniper trees using tools proposed in table 01.
- Ash Creek Pasture - Use prescribed fire to manage invasive species and brush.
- Home Pasture - Add two miles to existing pipeline along with a 10,000 gallon storage tank and three troughs.
- Home Pasture - Reduce the density of juniper trees using tools proposed in table 01.
- Home Pasture - Use prescribed fire to manage invasive species and brush.
- Jackson/ Survey Pasture - Reduce the density of juniper trees using tools proposed in table 01.
- Home Pasture - Use prescribed fire to manage invasive species and brush.

Haystack Butte Allotment

The permittee proposes to begin grazing with his current stocking levels and increase as forage is available, not to exceed upper limits established by Tonto National Forest. Permitted use would be reflective of an estimated average annual forage production considering duration, timing, frequency, and intensity of grazing proposed. Specific numbers would be determined each year

based on resource conditions and management objectives. The intent of this strategy is to conservatively stock the allotment with a core herd and supplement that herd with additional cattle, when forage is available, to maximize economic viability while protecting and improving resource conditions. Continued use of water rights claims or applications for stock use would occur. Use of the allotment would be yearlong. Grazing management would ensure that pastures receive periodic growing season rest or deferment to provide for grazed plant recovery. Sequence and timing of grazing would be determined annually based on resource conditions.

Continued use and maintenance of existing range improvements would occur. Management structures authorized under special use permit would continue to be used and maintained. This includes ranch headquarters (operated under a special use permit) and associated structures and improvements, which are integral to efficient and successful management of ranching operations in the remote location of the allotment.

Proposed improvements listed below would promote achievement of desired conditions in addition to maintenance of existing range improvements. Other new improvements may be identified after a decision is made for this proposal and would be analyzed appropriately at that time.

- Drill well at Haystack Butte headquarters to provide water to house, corrals, and a future pumping plant.
- West Steer Pasture - Install water line from Yellow Jacket Spring. Replace existing troughs and add new troughs.
- Cottonwood Pasture - Install water lines from two existing horizontal wells. Replace existing troughs and add new troughs.
- Cottonwood Pasture - Install water line from Willow Spring to Gleason Corral. Replace existing troughs and add new troughs.
- Upper River Pasture - Extend existing water line from Division Spring to Little Butte Corral. Add new troughs and replace existing troughs.
- Upper River/ Cottonwood/ River Pasture - Install water line along Windy Ridge Road to new corral and new trough.
- River Pasture - Extend water line from Black Mesa Tank to proposed corral. Add new troughs and replace existing troughs.
- Extend water line from White Ledges Spring to Bob's Pocket. Replace existing troughs and add new troughs.
- Bronson Pasture - Drill a well at Bronson Spring. Install a solar pumping plant with three miles of water line to a new, 10,000 gallon storage tank. Install new water line from this storage tank six miles out with seven new troughs.
- Bronson Pasture - Install three miles of fencing to divide pasture, creating two units.
- Ash Creek - Drill two new wells and install solar pumping plants, add four 10,000 gallon storage tanks and eight miles of water line to ten new troughs.
- Ash Creek - Rebuild or maintain all dirt roads in pasture for safe operation and better management.
- Ash Creek - Install a new corral with storage tank and troughs.
- Ash Creek - Install a holding pasture.

Sedow Allotment

The ultimate goal of the Sedow Allotment permittees is to continue a viable and sustainable operation grazing a cow-calf livestock herd with yearling carryover utilizing appropriate AUMs

within Forest upper limits for grazing. Their current priorities are to add more water resource locations for better distribution of and utilization by livestock and wildlife.

The permittees have worked to divide their allotment from four pastures into eleven pastures over past decades and feel their current rest-rotation grazing system is adequately managed with those eleven pastures. Adding additional water developments would provide for better livestock distribution and improved utilization. Additionally, cattle would not expend as much energy traveling far distances to water, which could improve conception and increase weaning weights. Improved revenue would allow the ranch to maintain itself and benefit the community with additional monies for local spending.

As funding becomes available to them, the permittees propose the following improvements:

- Jackson - Extend an existing pipeline from an existing storage tank and add two water troughs.
- Seven Mile - Extend an existing pipeline from an existing storage tank and add one or two water troughs.
- Indian Gardens - Add a pipeline from Rock Springs to Indian Gardens' storage tank and water trough.
- Walnut Pasture - Add a pipeline from private property to a new 10,000 gallon storage tank with two or three new troughs. Add a pipeline from this storage tank to Hudson and add an additional two to three troughs.
- Miners Camp Well - Extend a new pipeline to corral in Monument Pasture and Paul Summers corral; possibly adding one to two troughs.
- Reveg and Walnut - Replace an existing pipeline and add troughs.
- Brunson Pasture - Develop additional water from existing spring development.
- JU Trap Spring - Add pipeline from spring to new trough.
- Find and develop a spring in Brush Pasture.
- Add pipeline from Middle trough to Levi's Hold Up.
- Add pipeline from New Corral Spring into Hess Pasture with one or two new troughs.

Hicks-Pikes Peak Allotment

The permittees propose to implement a flexible grazing strategy to maintain an economically viable livestock operation, while balancing allowable forage use with forage production to maintain or improve resource conditions. Yearlong grazing is proposed, with up to 500 adult cattle using a deferred rotation grazing strategy. Calves from the herd would be grazed from January to mid-May (estimated at up to 400 head). The permittees propose to graze additional livestock from one or more allotments held by owners of Rockin' 4 Ranch when forage is available. They also propose to purchase supplemental yearlings for seasonal grazing when forage is available. The intent of their grazing strategy is to conservatively stock the allotments with a core herd and supplement with additional cattle when forage is available to maximize economic viability, while protecting and improving resource conditions.

Proposed range improvements include the following:

- Fencing to divide Horseshoe Bend Pasture into three units.
- Fencing to divide Windmill Pasture into three units.
- Fencing to divide Ortega Pasture into three units.
- Fencing to divide Upper Shute Pasture into two units.
- Fencing to divide Lower Shute Pasture into two units.

- Extend existing water lines from developed springs and windmills into underserved areas in all pastures to improve livestock distribution and benefit wildlife.
- Install troughs along water lines to provide water no more than 1 mile apart.
- Add storage tanks to existing windmills to improve capacity.
- Improve forest roads in Ortega Pasture to assist in transporting livestock.
- Improve roads in Kenny Pasture to assist in transporting water and livestock.
- Install working corrals in each pasture.
- Install cattle guards on roads where gates currently exist in all pastures and at allotment boundaries.
- Prescribed fire in Murphy Pasture to reduce unpalatable brush cover and allow recruitment of more palatable forage plants. Repeat burning could reduce populations of invasive species.
- Establish trial plots for treatment of noxious weeds using a variety of tools as described in table 01.

Dagger Allotment

Dagger permittees propose to graze up to 650 cattle (cows, bulls, yearlings) with up to 12 horses as needed to maintain their operation. Livestock numbers could increase through carryover of progeny or supplemental yearlings as resource conditions were favorable. Their goal is to conduct an economically viable operation by maintaining an adaptive management strategy that balances forage use with forage production which sustains or improves resources. They propose to continue following a deferred rotation schedule within utilization limits, incorporating resource management tools based on best available science. Single or multiple herds would be established depending on resource conditions. Layout of the allotment generally provides for use of high elevation range in warmer months and low elevation range in colder months. Adaptive management strategies would determine specific rotation schedules on an annual basis, described in annual operating instructions at the district level.

Dagger permittees propose to install the following improvements to enhance livestock distribution and relieve grazing pressure on riparian areas formerly identified as primary water sources:

- Upper Dry Creek and Oak Creek Mesa Pastures - trick tanks would be constructed along with two troughs and approximately one mile of pipe
- Upper Coon Creek Pasture - using natural boundaries and approximately 1.5 miles of fence, pasture would be split into four separate units.
- Cherry Creek Riparian Fence - move the northern location to include a small pocket of perennial surface water that would allow for better cattle distribution.
- Rock Pasture - one mile of pipe would be added to Pringle Well, extending to a new trough. Another mile of pipe would be added to Dagger Well to provide additional water.
- Upper Coon Creek and West Devore Pasture - water would be taken from Cherry Creek and pumped to troughs.
- Upper Coon Creek Pasture - construct a saddle tank.
- Upper Dry Creek and Upper Coon Creek - from private water source near Coon Creek, install two storage tanks and three troughs
- Additional range improvement projects may become necessary during future management of the allotment and would be analyzed appropriately when identified.

Poison Springs Allotment

Poison Spring permittees propose to utilize adaptive management to protect and enhance natural resources and foliage conditions. Their objective is to revive naturally raised beef for health conscious consumers, while improving vegetation and natural resource conditions. They propose up to 225 adult cattle in pastures south of the Salt River yearlong and up to 250 adult steers in pastures north of the Salt River yearlong. Calves from the herd south of Salt River would be used as replacement cattle for the yearling operation north of Salt River. Steers 12 to 14 months old would be sold as natural range fed Arizona beef. Along with cattle, the permittees propose up to twelve horses to provide ranchers in the area with a source of locally raised working ranch stock.

Along with restoring existing structural improvements, the following improvements are proposed to enhance livestock distribution on the allotment:

- Intake Pasture - Extend an existing water line from Poison Spring and add troughs to benefit livestock and wildlife.
- Blevins Pasture - Divide with fencing to create Tucker's Pasture. Extend existing water lines from Pinto Creek Well and Blevins Wash Windmill and add troughs.
- Summit Pasture - Extend an existing water line from Summit Windmill and add troughs.
- East Highway Pasture - Divide with fencing to create Bull Pasture. Bulls would be watered at Bar Eleven Ranch headquarters.
- South Willow Pasture - Extend existing water line from Willow Springs corral and add troughs to South Willow and East Highway Pastures.
- Braddock Pasture - Establish a solar-powered well west of FR 203 and add pipeline and troughs.
- North Black Mesa Pasture - Extend an existing water line from Jose Windmill and add storage and troughs.
- Additional range improvement projects may become necessary during the future management of the allotment and would be analyzed appropriately when identified.

Wilderness Range Improvements (appendix A, map 5)

The following existing range improvements are located in wilderness areas. This action proposes to use motorized equipment to maintain improvements originally constructed with motorized devices in Sierra Ancha and Salt River Wilderness in previously disturbed areas unless the feature predates establishment of the wilderness area. These actions would be within Congressional Grazing Guidelines established for grazing in national forest wilderness areas (FSM 2323.26b) which states: “Where practical alternatives do not exist, maintenance or other activities may be accomplished through the occasional use of motorized equipment, for example, the use of backhoes to maintain stock ponds, pickup trucks for major fence repairs, or specialized equipment to repair stock watering facilities.”

Table 2: Proposed Wilderness Range Improvement Maintenance with Mechanized Equipment

Improvement Number	Improvement Name	Improvement Type	Year Constructed	Comments	Wilderness
610541-Dagger Allotment	Mesa Tank	Stock tank	1930	Bring a dozer in on an existing trail to clean out silt	Sierra Ancha
610515-Dagger Allotment	Never Go Dry 1	Stock tank	1960	Bring a dozer in on an existing trail to clean out silt	Sierra Ancha
610550-Dagger Allotment	Never Go Dry 2	Sediment trap for 610515	1960	Bring a dozer in on an existing trail to clean out silt	Sierra Ancha
610534-Dagger Allotment	Deep Creek Tank	Stock tank	1930	Bring a dozer in on an existing trail to clean out silt	Sierra Ancha
610516-Dagger Allotment	Ridge Tank	Stock tank	1960	Bring a dozer in on an existing trail to clean out silt	Sierra Ancha
610551-Dagger Allotment	Unnamed Tank	Stock tank	Unknown	Bring a dozer in to clean out silt	Sierra Ancha
688034-Poison Springs Allotment	Barley Patch Tank	Stock tank	1930	Bring a dozer in to clean out silt- may need to move cross-country	Salt River
688030-Poison Springs Allotment	Tucker Tank	Stock tank	1930	Bring a dozer in to clean out silt- may need to move cross-country	Salt River

Improvement Number	Improvement Name	Improvement Type	Year Constructed	Comments	Wilderness
688033-Poison Spring Allotment	Ground Tank	Stock tank	1930	Bring a dozer in to clean out silt-may need to move cross-country	Salt River
223037-Haystack Butte Allotment	White Ledges Spring	Spring, pipeline, and trough	1930	Use chainsaw, hand tools, as needed	Salt River
223059-Haystack Butte Allotment	White Ledges corral	Corral	1930	Use chainsaw, hand tools, as needed	Salt River
223060-Haystack Butte Allotment	Deer Spring	Concrete trough, pipeline, wire pen, spring box	1945 (est.)	Use chainsaw, hand tools, as needed	Salt River
223017-Haystack Butte Allotment	White Ledges trap	Small holding unit	1930	Use chainsaw, hand tools, and possible vehicle access to rebuild fence; cut posts in project area or pack in	Salt River
223024-Haystack Butte Allotment	Black Mesa Tank	Dirt tank	1960	Use dozer to clean out the tank and line with bentonite; existing track to tank	Salt River

Alternative 4 - Wildlife Habitat Optimization

- Change grazing strategy to seasonal winter/spring use (November to May) across the entire landscape, while continuing a rest-deferred rotational strategy (appendix A, map 6).
- No grazing Salt River corridor and Upper Oak Creek Mesa Pasture.
- No grazing key riparian reaches.
- Use game and nongame species habitat prescriptions to optimize forage and production. This can include but is not limited to natural or prescribed fire, mechanical treatments, and re-vegetation.
- No new development of springs and seeps or increasing use on developed springs and seeps. Instead of developing springs build wells or saddle tanks that use a different source of water.
- Reintroductions of special status species (MIS, forest sensitive, native fish, etc.) throughout the landscape where criteria are met.

Preferred Alternative - Proposed Action with Species Conservation Measures

The Forest Service has identified alternative 3 (proposed action) as their preferred alternative. Alternative 3 provides maximum opportunity for meeting agency goals and objectives and the purpose and need of this analysis through application of a wide range of vegetation management tools, including livestock grazing. Following scoping, a need was identified to incorporate April 2012 consultation and concurrence from U.S. Fish and Wildlife Service for the Forest Plan. The preferred alternative incorporates conservation measures, summarized in appendix C, to include specific management criteria derived from recovery plans for Mexican spotted owl, Southwestern willow flycatcher, and Chiricahua leopard frog.

Mitigation and Management Common to all Action Alternatives

Adaptive Management

Adaptive management uses monitoring results to continually modify management in order to achieve specific objectives. Action alternatives would provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired resource conditions are not being achieved, adaptive management decisions would be used to modify management. Such changes may include annual administrative decisions to adjust the specific number of livestock, specific dates for grazing, class of animal or pasture rotations. These changes would not exceed limits for timing, intensity, duration and frequency as needed to achieve management goals and objectives. Adaptive management would be implemented through annual operating instructions, which would adjust livestock numbers and the timing of grazing so that use is consistent with current productivity and capacity and is meeting management objectives.

Adaptive management also includes monitoring to determine whether identified structural improvements are necessary or need to be modified. In the case that changing circumstances require physical improvements or management actions not disclosed or analyzed herein, further interdisciplinary review would occur. The review would consider any changed circumstances and site-specific environmental effects of improvements in the context of the overall project. Based on results of interdisciplinary review, district rangers would determine whether correction, supplementation or revision of the EIS is necessary in accordance with Forest Service policy or if further analysis under NEPA is required.

Monitoring

The objective of monitoring is to determine if management is being properly implemented and whether actions are effective at achieving or moving toward desired conditions. Monitoring as described below would take place under all grazing alternatives.

The purpose of effectiveness monitoring is to track condition and trend of upland and riparian vegetation, soil, and watersheds. Monitoring of key areas would follow procedures described in “Utilization Studies and Residual Measurements” (ITT 1999) and Region 3 Rangeland Analysis and Training Guide (FSH 2209.21). These data are interpreted to determine if management is achieving desired resource conditions, if changes in resource condition are related to management, and to determine if modifications in management are necessary. Effectiveness monitoring would occur at least once over the ten-year term of the grazing authorization or more frequently, if deemed necessary. Effectiveness monitoring in riparian areas would use cross sections as described in Harrelson, et al. (1994), riparian photo points, or most current methods.

The purpose of implementation monitoring is to determine if grazing meets conservative use guidelines in upland and riparian settings. Implementation monitoring would occur at any time during the grazing year and include such things as inspection reports, forage utilization measurements, livestock counts and range improvement inspections. Utilization measurements in uplands and riparian areas would be made following methods found in “Utilization Studies and Residual Measurements” (ITT 1999), “Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands” (Smith et al. 2005), and in reference to current scientific papers which are applicable to management of vegetation types in the project area. Data could include browse utilization measurements, perennial grass stubble height measurements, photo points, or height/weight relationships for certain perennial grass species.

Information would be collected through routine pasture inspections, end of season utilization monitoring, Parker Three-Step monitoring, and cooperative monitoring. Specific schedules for monitoring would be flexible from year to year based upon resource needs, which could change with climatic variations and management changes. Monitoring for plant cover, vigor, recruitment, and diversity using techniques described in aforementioned publications would ensure that wildlife needs and riparian and watershed conditions were moving toward desired conditions as outlined in chapter 1.

Monitoring information from cooperative monitoring would be considered and includes dry weight ranks, distance to closest perennial plants, and palatable forage production information. Consistent patterns of utilization meeting or exceeding conservative use guidelines (up to 40 percent) on key species in key upland areas or meeting Forest guidelines for riparian areas would be used as a basis to modify management practices or take administrative actions such as reducing authorized and permitted numbers in order to reduce utilization in subsequent grazing seasons.

Key areas are described in “Utilization Studies and Residual Measurements” (ITT 1999) as indicator areas that are able to reflect what is happening on a larger area as a result of on-the-ground management actions. A key area should be a representative sample of a large stratum, such as a pasture, grazing allotment, wildlife habitat area, herd management area, watershed area, etc., depending on the management objectives being addressed by the study. Proper selection of key areas requires appropriate stratification.

Riparian vegetation available in key reaches would be monitored using riparian utilization measurements (implementation monitoring) following the ITT (1999) and Burton (2011) or the most current acceptable method.

Changes in riparian vegetation and stream channel geomorphology condition and trend would be measured at five to ten year intervals (effectiveness monitoring) using protocols described in “Utilization Studies and Residual Measurements” (ITT 1999), Burton (2011), and Harrelson, et al. (1994), photo point monitoring, or the most current acceptable method.

While monitoring techniques as described above would be conducted in key areas, these would not be the sole locations for gathering information from grazing allotments to make decisions about timing, intensity, duration, or frequency of livestock grazing in a given grazing season. Overall condition of allotments and such things as distribution patterns or rangeland improvement conditions could be assessed at any given time to help make those decisions.

Mitigation

Vegetation and Soils: Forage utilization would be managed at a level corresponding with light to conservative utilization (30 to 40 percent on perennial grasses; (Holechek 2004, FSH 2209.13-2007-1 R3)) except in special project areas where vegetation treatments are being applied (see alternative 3). Use of browse species and annuals would be limited to not more than 50 percent of current annual growth in order to provide for grazed plant recovery, increases in herbage production and retention of herbaceous litter to protect soils.

In Sonoran Desert pastures, grazing intensity including utilization would be monitored. Light intensity use as defined by Holechek, et al. (2004) differs from light to conservative utilization in that it looks at impacts to soils and vegetation at a landscape level rather than solely at utilization of perennial plants. Light intensity use reflects use of only choice plants and areas with no use of poor forage plants. Range should appear practically undisturbed away from water developments except where targeted grazing is occurring.

Range Improvements/ Management: Guidelines and standards for most existing range improvements are as follows unless site-specific modifications are required:

- Any maintenance or reconstruction of improvements should be confined within original site disturbance and construction. New soil disturbance should not occur.
- Access to improvement sites would be on existing roads. If road improvement is needed to access sites, prior approval by the District Office is required.
- Obligate riparian vegetation should not be disturbed, including but not limited to willows, cottonwoods, and sycamores.
- Troughs: an overflow pipe, automatic shut-off valve, and approved wildlife entry/escape ramp should be installed. Troughs should be placed on rocks or concrete to prevent mud holes or sinkholes. Troughs should be painted a color which best blends with surrounding landscapes. Water should be transported outside riparian areas.
- Storage tanks: should be painted a color which best blends with surrounding landscapes. Open top storage tanks should have approved wildlife escape ramps.
- Pipelines: should use existing pipeline routes for replacement of existing lines. Placement of above or below ground lines would be determined on a site-specific basis.

- Fences: a fence comprises four strands, with a smooth bottom wire at 16 inches off the ground and a maximum top wire height of 42 inches. If live trees are used as posts, trees must be protected from direct contact with the wire to prevent girdling.
- Wells: if using liquid or air drilling mediums, all drilled solids and fluids must be water-misted at exhaust point to reduce air particulates before being moved off-forest. If wells are re-drilled, registration of water rights should be made through Arizona Department of Water Resources in favor of USA-USDA-Forest Service-Tonto National Forest.
- Additional guidelines for range improvements can be found in the Forest Service Structural Range Improvement Handbook (FSH 2209.22 R3).

Riparian: For riparian monitoring Tonto NF is using Cole Browse methodology to monitor riparian woody species, and the Height-Weight method for deergrass in “Utilization Studies and Residual Measurements” (ITT 1999). According to ITT (1999) in the chapter on Study Design and Analysis, before monitoring, planning is necessary to determine objectives of monitoring, design of the study and statistical validity of the measurements. Tonto NF has determined that in a reach of approximately 1,000 feet, sampling of 30 to 50 plants within that reach is necessary for statistically valid monitoring.

Use guidelines for riparian components are as follows: *obligate riparian tree species* – limit use to < 50 percent of terminal leaders (top one-third of plant) on palatable riparian tree species accessible to livestock (usually ≤ 6 feet tall); *deergrass* – limit use to < 40 percent of plant species biomass; *emergent species* (rushes, sedges, cat-tails, horse-tails) – maintain six to eight inches of stubble height during the grazing period; *stream banks*- limit use to < 20 percent of alterable banks where stream banks are present or forming. Once riparian utilization guidelines are met, cattle would be moved to the next scheduled pasture regardless of available forage in the uplands. It may become necessary to minimize or remove access to riparian habitat, if grazing pressure becomes a limiting factor in the use of pastures.

Wildlife

- Follow conservation measures and terms and conditions for the Tonto NF Plan Biological Opinion (USFWS 2012) for TES species
- Minimize or eliminate adverse effects to MSOs on the Tonto NF.
- Minimize or eliminate adverse effects to MSO habitat on the Tonto NF.
- Monitor the impacts of site-specific projects implemented on the MSO.
- Where feasible, the Tonto NF shall avoid activities within 0.25 mile of PACs during the MSO breeding season (March 1 to August 31) that could result in disturbance to owls.
- On site-specific projects, the USFS will work with FWS to identify and implement additional reasonable measures, specific to the project, to minimize effects to owls.
- Where feasible, vegetation management treatments (which could include activities such as fuels reduction, utility line maintenance, etc.) will maintain adequate amounts of important habitat features for MSOs (such as large trees, large snags, and large logs)
- The Tonto NF shall monitor incidental take resulting from the proposed action and report their findings to the FWS. Incidental take (implementation) monitoring shall include information such as when or if the project was implemented, whether the project was implemented as analyzed in the site specific BO (including CMs and best management practices (BMPs)), breeding season(s) over which the project occurred, relevant MSO survey information, and any other pertinent information about the project’s effects on the species.

- Annual reports, which will include this species, shall be sent to the appropriate local FWS Ecological Services field office by March 1st of each year.
- Minimize or eliminate adverse effects to Southwestern willow flycatchers on the Tonto NF.
- Minimize or eliminate adverse effects to Southwestern willow flycatcher habitat on the Tonto NF.
- Monitor the impacts of site-specific projects on the Southwestern willow flycatcher on the Tonto NF.
- Proposed projects that may disturb Southwestern willow flycatchers should be implemented outside of the breeding season.
- Where appropriate, promote the growth of Southwestern willow flycatcher habitat that contains native vegetation so that Southwestern willow flycatchers may expand their numbers on the Forest.
- The Tonto NF shall monitor incidental take resulting from the proposed action and report their findings to the FWS. Incidental take (implementation) monitoring shall include information such as when or if the project was implemented, whether the project was implemented as analyzed in the site-specific BO/CO (including CMs and BMPs), breeding season(s) over which the project occurred, relevant Southwestern willow flycatcher survey information, and any other pertinent information about the project's effects on the species.
- Time grazing to promote perennial grass recovery and provide cover for wildlife species. Improve riparian and spring conditions to benefit riparian dependent resources through management of grazing and other activities.
- Reduce livestock use in riparian and spring areas during the growing season to minimize impacts to woody and herbaceous plants and alterable banks.
- Make appropriate adjustments to Annual Operating Instructions when necessary to accelerate resource recovery from disturbances such as drought, fire, flood, disease, etc.
- Manage for sufficient litter cover to minimize exposed soil, thus improving soil conditions over time.
- Watersheds shall be managed so as to improve them to satisfactory or better condition.
- Provide wildlife access and escape on all livestock and wildlife water developments (U.S. Forest Service 1985).
- Build range fences according to standards that provide for wildlife passage/crossing.
- Tonto NF Drought Policy would be used to provide protection to range resources during time of drought.

Monitoring

Managers would use range, riparian, soil, species and habitat, and terrestrial ecosystem surveys to determine if existing conditions on the allotment are reaching desired conditions.

The Forest Service, Arizona Game and Fish, U.S. Fish and Wildlife Service, Bureau of Reclamation, Christmas Bird Count Participants, and others may also conduct surveys for aquatic and terrestrial species and associated habitats.

- Managers may use photo points to establish baseline information and determine trend.
- Stream channel cross sections would help to determine change(s) in stream morphology and composition.
- Vegetation would be monitored in critical riparian areas and key areas to document and track changes, and determine trend.

Recreation: Best Management Practices recommendations

In Salt River Canyon Wilderness, construct needed structural range improvements from native materials when possible. Pipelines (where essential) should be buried. See “Salt River Canyon Wilderness Implementation Plan” (SRCWIP) (U.S. Forest Service 1993).

- Construct only minimal new range improvements deemed essential for level B management (U.S. Forest Service 1985). “Construction of new range improvements may be approved if they are necessary for resource protection (range and/or wilderness) and effective management of these resources. Do not approve construction solely to accommodate increased grazing” (FSM 2300; 2320.1).
- Preserve a wide spectrum of primitive recreation opportunities consistent with established objectives for each opportunity class. A high priority will be placed on maintaining the integrity of WOS classes (U.S. Forest Service 1993).
- Manage for the Visual Quality Objective of “Preservation” (provides for ecological changes only) in the Salt River Canyon and Sierra Ancha Wildernesses (U.S. Forest Service 1985).
- Manage for the Visual Quality Objective of “Retention” (man’s activities are not evident to the casual observer) in the Upper Salt River management area.
- In wilderness, accomplish management activities with non-motorized equipment and non-mechanical transport of supplies and personnel. Exclude the sight, sound, and other tangible evidence of motorized equipment or mechanical transport within the wilderness except where they are needed and justified (FSM 2300; 2326.02). Do not approve use of motorized equipment or mechanical transport unless justified as described in Forest Service Manual 2300, 2326.1. (FSM 2300; 2326.03)
- Ensure that other activities authorized by the *Wilderness Act*, including grazing, will be conducted to minimize their impact on wilderness character (U.S. Forest Service 1985).
- Permittees request for use of motorized equipment will be thoroughly analyzed to ensure they meet the “rule of practical necessity and reasonableness” thereby ensuring the least impact possible on recreational users wilderness experience (U.S. Forest Service 1993).
- Salt blocks will be located away from water and areas of public concentration and necessary feeders will be constructed of natural materials (U.S. Forest Service 1993).

Heritage/ Archaeology:

Any range improvement which would disturb soil would require an archaeological clearance by the Forest Archaeologist or a certified para-archaeologist. New improvements not anticipated by this decision would also require separate analysis to comply with NEPA regulations. Salting, watering, or supplemental feeding would not be permitted where cultural sites or resources exist.

Mitigation of impacts to heritage resources for all alternatives would be accomplished by avoiding these properties through placement and construction of all range improvements. Minimizing localized concentration of animals, improving livestock distribution across allotments, and reducing intensity of grazing would also minimize surface disturbance to heritage resources. Where proposed improvements would involve ground disturbance, 100 percent archaeological survey would be conducted. Other, more specific mitigation requirements may be identified as each improvement is developed and a heritage inventory is made of their areas of potential effect. Such protective measures are developed in accordance with goals of the project taking into account site vulnerability as well as methods of project implementation. All inventoried heritage sites are treated as eligible for the National Register of Historic Places with

the exception of those that have been formally determined to be not eligible in consultation with SHPO.

Archaeological clearance must be approved with all necessary consultation with SHPO and potentially interested Tribes prior to issuing any decision regarding construction, modification, or removal of all improvements. This approach is based on long-term consultation with SHPO and Region 3 policy as embodied in “*First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities*” (Programmatic Agreement) between U.S. Forest Service Region 3, State Historic Preservation Officers of Arizona, New Mexico, Texas, and Oklahoma, and Advisory Council on Historic Preservation, signed December 24, 2003, and specifically, Appendix H, “*Standard Consultation Protocol for Rangeland Management*” (Protocol) developed pursuant to Stipulation IV.A of the *Programmatic Agreement* is considered to be “standard operating procedure” for treating potential grazing impacts to heritage resources on Tonto NF. Protection measures identified under the Protocol include:

Archaeological surveys would be conducted for areas proposed for surface disturbance which have no previous survey coverage, or have outdated surveys which do not conform to current standards.

- Relocation or redesign of proposed range improvements and ground-disturbing management practices to avoid direct and indirect impacts to historic properties.
- Relocation of existing range improvements and salting locations sufficient to ensure the protection of historic properties being impacted by concentrated grazing.
- Fencing or exclosure of livestock from individual sensitive historic properties or areas containing multiple sensitive historic properties being impacted by grazing.
- Periodic monitoring to assess site condition and to ensure that protection measures are effective.

Other mitigation measures involving data recovery, for example, may be developed and implemented in consultation with the SHPO as the need arises. Appropriate Tribes would be consulted if mitigation is invasive or it affects a TCP or other property of concern for them.

Other specific protection measures may need to be developed on a case by case basis.

In accordance with the Protocol, monitoring would be conducted as part of the day-to-day activities of professional cultural resource specialists and certified para-archaeologists working in the area. Grazing allotments cover most of any given forest, and when archaeologists are in the field conducting surveys they are most likely surveying within a grazing allotment.

Archaeologists would use these opportunities to observe and report on grazing activities, effectiveness of grazing strategies, and potential impacts to heritage resources. Any incidents of damage to historic properties from grazing practices would be reported, and archaeologists would draw upon protection measures outlined in the Protocol to ensure that effects are avoided or minimized.

Alternatives Considered But Eliminated From Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action, as well as concerns raised by the project interdisciplinary team, provided suggestions for

alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of this project, duplicative of alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, two alternatives were considered but dismissed from detailed consideration for reasons summarized below:

Two additional alternatives were originally considered:

- Recreation /Visual alternative: this was to address the concern of livestock grazing effects to recreationists who whitewater raft along the Salt River Corridor and through the Salt River Wilderness. Objectives of this alternative were determined to be addressed in Alternatives 1 and 2, No Action/No Grazing and Current Management.
- Soils Condition alternative: this was considered to address the concern of livestock grazing effects to unsatisfactory and impaired soils conditions. Objectives of this alternative were determined to be addressed in Alternatives 1 and 3, No Action/No Grazing and the Proposed Action.

Comparison of Alternatives

This section provides a summary of effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. Effects of vegetation management tools described in chapter 2 are summarized in chapter 3 under each resource.

Table 3: Comparison of Alternatives by Vegetation Type

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Riparian	<p>Vegetation: Most rapid recovery of vegetation and stream function would occur in the absence of livestock grazing. Not piping water away from streams and springs for livestock use would facilitate increase in density, cover, and area of riparian vegetation. Improved upland vegetation conditions would reduce runoff effects. Lack of grazing pressure on palatable native vegetation would enhance competition against non-native species, potentially reducing exotic and undesirable vegetation.</p> <p>Wildlife: habitat</p>	<p>Vegetation: In areas with sufficient vegetation, if riparian utilization guidelines are followed and cattle are moved when use levels are met, undesirable effects of grazing would be minimized and riparian areas and stream channels should improve, although at a slower rate than alternative 1. Riparian areas lacking key vegetation species likely won't recover unless they are not grazed until sufficient vegetation has re-established. Piping water to offsite livestock watering facilities can reduce potential for vegetation recovery and maintenance through dewatering, but may be beneficial by reducing livestock impacts to stream channels. Troughs located in stream channels reduce potential for recovery.</p> <p>Wildlife: grazing promotes</p>	<p>Vegetation: Effects would be similar to alternative 2 although more pronounced and widespread with access to the Salt River and riparian areas in upper Oak Creek Mesa. Once livestock access the Salt River, there may be congregation on small beaches, significantly impacting riparian vegetation in a short time. Recovering native vegetation along the river is unlikely even with implementation of vegetation management tools due to livestock concentration. Water quality standards for Salt River may be impacted by this alternative.</p> <p>Wildlife: timing and duration would determine extent of grazing effects. General downward trend in habitat quality for many species; more</p>	<p>Vegetation: Effects would be similar to alternative 1.</p> <p>Wildlife: similar to alternative 1 for TES species; reduced riparian impacts.</p> <p>Recreation: effects would be similar to alternative 2 for Riparian.</p> <p>Socioeconomics: similar to alternative 2 for Riparian.</p>

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Riparian	<p>conditions would improve rapidly; potential for riparian dependent wildlife species would improve; improvements to aquatic habitat would be rapid; springs would return to a natural state and improve habitat quality; crayfish may still negatively affect macroinvertebrates; significant positive impacts for special status species.</p> <p>Recreation: desired conditions for upper Salt River corridor would be met. Action would not preclude Wild and Scenic River designation; wilderness emphasis would be preserved; Visual Quality Objectives would be met; Limits of Acceptable Change would likely not be exceeded.</p> <p>Socioeconomics:</p>	<p>species diversity but compromises natural successional processes and reduces palatable native plants; bird habitat is altered; fish populations are vulnerable to removal during scouring floods if banks are destabilized; riparian overstory is reduced, compromising stream temperature, cover, nesting habitat; overall habitat quality may not improve.</p> <p>Recreation: current management excludes grazing from river corridor; this would continue so effects would be similar to alternative 1 along river. Visible range improvements would limit VQO.</p> <p>Socioeconomics: commercial outfitters would benefit by continuing to provide high-quality rafting experience on the Salt River; grazing permittees would be limited in how they maximize income potential on allotments; funded EQIP contracts could be suspended until NEPA analysis is completed for individual projects.</p>	<p>undesirable effects than alternative 2 due to increased distribution and higher numbers; may cause listing of sensitive plants and take of endangered species.</p> <p>Recreation: undesirable impacts to river corridor, scenery, and wildlife viewing opportunities; adverse effect to Outstandingly Remarkable Values for WSR possibly affecting designation; undesirable effects to campsites, possibly exceeding LOC.</p> <p>Socioeconomics: commercial outfitters may be adversely affected due to livestock/camper conflicts on limited campsites along Salt River; grazing permittees would be able to maximize income potential with increased numbers and operational efficiencies; funded contracts could be implemented quickly with potential for future contracts.</p>	

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Riparian	commercial outfitters would benefit by continuing to provide a high-quality rafting experience on the Salt River; grazing permittees would be adversely affected though loss of income from grazing; funded contracts for range improvement construction could be lost, adversely affecting permittees in the project area but potentially benefitting recipients elsewhere; would not affect federal payments to counties; feelings of mistrust and loss of lifestyle may occur for permittees; those who perceive grazing of federal lands to be unsuitable may feel an increased positive attitude towards the agency.			
Sonoran Desert	Vegetation: most rapid increase in cover,	Vegetation: slower increase in cover and diversity; priority use of	Vegetation: effects described for alternative 2 Sonoran Desert	Vegetation: decreased grazing pressure during

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Sonoran Desert	diversity; increased water availability for plant use especially in areas of livestock concentration; elimination of grazing pressure; rapid increase in annual forb and grass cover; reduced transport of noxious weeds; increased production of biological soil crusts; better opportunity for saguaro recruitment; potential increased threat of wildfire with increased fine fuels; potential increase in trespass livestock use without permittee presence. Soils: trampling and compaction would be reduced to effects caused by off-road travel and wildlife; removing range improvements would cause minor, localized short-term disturbances; soil cover would	water for livestock over vegetation; potential reduction of saguaro seedling survival; reduced reproduction of palatable shrubs and sub-shrubs; continued impacts to biological soil crusts; reduced fire threat from fine fuels; continued uneven livestock distribution; continued transport of noxious weeds by livestock; continued spread of shrubs requiring scarification for germination (mesquite, acacia); continued grazing pressure higher on slopes less than 40 percent. Soils: overall improvement of impaired and unsatisfactory soils would not be as fast as alternative 1 Sonoran Desert. Improvement of soils in pastures not currently being grazed would be similar to those described for alternative 1 Sonoran Desert. Soils in satisfactory condition are expected to remain so with proposed use guidelines. Fire and Fuels: fire activity would be similar to current levels. Fine fuels are reduced when grazed while palatable (green). Wildlife: see effects for Riparian	would be more pronounced and widespread because of higher livestock numbers and increased distribution. Uneven distribution would be less pronounced. More range improvements would result in more areas of concentration. Vegetation management tools could offset or minimize undesirable effects and provide opportunity for more rapid vegetation recovery. Additional pastures would be used that are not used in alternative 2. Soils: rate of improvement of impaired and unsatisfactory soils would be similar to alternative 2 Sonoran Desert, except more limited in acreage as all pastures are proposed for grazing. Effects to satisfactory soils are similar to alternative 2 Sonoran Desert. Proposed improvements would have an overall positive effect by improving livestock distribution but could create undesirable effects by drawing cattle on to soils that previously received light or no use. Vegetation	key growing seasons for most plants; browsing of some winter-growing species would be enhanced; limited water availability may cause uneven livestock distribution; enhanced opportunity for vegetation recruitment; effects to biological soil crusts would be less pronounced than under yearlong grazing. In cooler temperatures, cattle may travel further upslope, increasing grazing pressure on slopes greater than 40 percent. Soils: effects would be similar to those described for alternative 3 Sonoran Desert with fewer acres being affected. Fire and Fuels: seasonal grazing may reduce threat of wildfire in Sonoran Desert by grazing while fine fuels are palatable; reintroduction of special status species would

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Sonoran Desert	<p>improve most rapidly Fire and Fuels: probability of high intensity fire would increase with more fine fuel accumulation. Fire regime may shift and mean fire interval may be reduced. Vegetation type conversion may eventually occur. Larger fires would produce more smoke and increase human impacts. Noxious weed management may reduce fuel loading and reduce chances of uncharacteristic fire. Wildlife: see effects for Riparian; small game and non-game species would increase; upland habitat capability would improve quickly. Recreation: grazing impacts to scenery and campsites would be removed, providing a more positive recreational experience;</p>	<p>alternative 2; general downward trend in habitat quality; predator control can affect prey species populations and distribution. Recreation: preservation of wilderness objectives would occur; Forest ability to provide recreation opportunities would be somewhat limited by visible evidence of grazing; upland range improvements inhibit Forest ability to manage Gleason segment of Salt River to meet VQO of “retention”. Heritage/ Archaeology: Livestock trampling and range improvement maintenance would continue to create potential for damage and displacement of sites and artifacts; grazing practices resulting in erosion and changes in vegetative composition can be especially damaging to traditional collecting areas; introduction of non-native plants can degrade sites. Air Quality: ground-disturbing activities can release particulate matter, if not properly mitigated. Effects are greatest during livestock trailing and travel on dirt</p>	<p>management tools would create intensified short-term soil disturbance effects within project areas but overall effects should be beneficial if tools are applied with best management practices as described in chapter 3. Fire and Fuels: similar to alternative 2 Sonoran Desert, with reduced potential for fire in Sonoran Desert due to grazing of previously excluded pastures; reduced potential for fire in Sierra Ancha Mountains with grazing of previously excluded ponderosa pine vegetation. Wildlife: See alternative 3 Sonoran Desert and Riparian effects. General downward trend in habitat quality and adverse effect to TES species. Recreation: management emphasis for wilderness may experience undesirable effects; inhibits Forest ability to provide for recreation opportunities in uplands and integrity of WOS opportunities in wilderness; hunting, fishing, bird watching</p>	<p>determine when and where treatments occur. Wildlife: similar to alternative 1 Sonoran Desert for TES species with positive effect from reintroduction efforts; reduced impacts to upland habitat; rapid improvement in riparian habitat. Recreation: same as alternative 2 Sonoran Desert. Habitat prescriptions may benefit wildlife and thereby benefit recreational users. Heritage/ Archaeology: effects would be similar to alternative 2 Sonoran Desert. Air Quality: effects would be similar to alternative 2 Sonoran Desert. Climate: effects would be similar to alternative 2 Sonoran Desert. Socioeconomics: see alternative 4 Riparian.</p>

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Sonoran Desert	<p>wilderness objectives would be met; VQOs would be met.</p> <p>Heritage/ Archaeology: This alternative removes one effect to cultural sites; other human effects would continue.</p> <p>Air Quality: effects would be somewhat minimized although difficult to determine at what level since cumulative effects would still affect air quality.</p> <p>Climate: effects may be somewhat minimized although difficult to determine at what level since cumulative effects would still impact climate.</p> <p>Socioeconomics: see alternative 1 Riparian.</p>	<p>roads.</p> <p>Climate: cattle may affect climate through methane emission or by altering the abundance or type of carbon-sequestering vegetation on the landscape. Emissions would be difficult to separate from cumulative effects and are expected to be low due to low livestock numbers.</p> <p>Socioeconomics: effects would be similar to alternative 2 Riparian.</p>	<p>may be adversely affected.</p> <p>Heritage/ Archaeology: Adverse effects are predicted for areas which have not been grazed historically or are exposed to more intensive grazing management, such as higher permitted numbers and high intensity/ short duration grazing; heritage resources would likely move away from desired conditions.</p> <p>Air quality: effects would be exacerbated over those in alternative 2 Sonoran Desert with increased range improvement construction, more widespread livestock distribution.</p> <p>Climate: may be somewhat higher effects than alternative 2 Sonoran Desert due to increased numbers, more widespread distribution.</p> <p>Socioeconomics: see alternative 3 Riparian.</p>	
Semi-desert Grassland	<p>Vegetation: most rapid increase in cover, diversity; increased water availability for plant use especially in</p>	<p>Vegetation: slower increase in cover and diversity; priority use of water for livestock over vegetation; reduced reproduction of palatable shrubs and sub-</p>	<p>Vegetation: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Soils: effects would be similar to alternative 3 Sonoran Desert.</p>	<p>Vegetation: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Soils: effects would be similar to alternative 4</p>

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Semi-desert Grassland	<p>areas of livestock concentration; elimination of grazing pressure; rapid increase in annual forb and grass cover; reduced transport of noxious weeds; increased production of biological soil crusts; potential increase in trespass livestock use without permittee presence.</p> <p>Soils: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Fire and Fuels: mean fire interval may return to normal with normal precipitation; invasive plants may be reduced with increased fire interval; larger, more frequent fires would increase smoke impacts.</p> <p>Wildlife: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Recreation: effects would be similar to alternative 1 Sonoran</p>	<p>shrubs; continued impacts to biological soil crusts; reduced fire potential with reduced fine fuels; continued uneven livestock distribution; continued transport of noxious weeds by livestock; continued spread of shrubs requiring scarification for germination (mesquite, acacia); continued grazing pressure higher on slopes less than 40 percent.</p> <p>Soils: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Fire and Fuels: activity levels would remain as current; mean fire return interval is too infrequent to meet reference conditions; woody plants may increase in absence of fire, altering the vegetation type and Fire Regime Condition Class (FRCC).</p> <p>Wildlife: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Recreation: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Air Quality: effects would be</p>	<p>Fire and Fuels: similar to effects for alternative 3 semi-desert grassland. Vegetation management tools may enhance fire's ability to move through vegetation types if best management practices are applied.</p> <p>Wildlife: effects would be similar to alternative 3 Sonoran Desert. Options for habitat improvements or restoration efforts would be limited.</p> <p>Recreation: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 3, Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 3 Riparian.</p>	<p>Sonoran Desert.</p> <p>Fire and Fuels: may reduce fuel loading for prescribed burns; Habitat prescriptions would benefit fire regimes when implemented under conditions that mimic natural mean fire intervals and fire regimes; reintroduction of special status species may determine when and where treatments are implemented or allowed.</p> <p>Wildlife: grazing from May to October has been shown to improve vegetative production in semi-desert grassland creating higher-quality winter habitat for elk and mule deer; would benefit grassland birds by providing undisturbed nesting areas.</p> <p>Recreation: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar</p>

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Semi-desert Grassland	Desert. Heritage/ Archaeology: effects would be similar to alternative 1 Sonoran Desert. Air Quality: effects would be similar to alternative 1 Sonoran Desert. Climate: effects would be similar to alternative 1 Sonoran Desert. Socioeconomics: effects would be similar to alternative 1 Riparian.	similar to alternative 2 Sonoran Desert. Climate: effects would be similar to alternative 2 Sonoran Desert. Socioeconomics: effects would be similar to alternative 2 Riparian.		to alternative 4 Sonoran Desert. Air Quality: effects would be similar to alternative 4 Sonoran Desert. Climate: effects would be similar to alternative 4 Sonoran Desert. Socioeconomics: effects would be similar to alternative 4 Riparian.
Juniper Savannah	Vegetation: effects would be similar to alternative 1 semi-desert grassland Soils: see alternative 1 semi-desert grassland. Fire and Fuels: current fire management techniques would continue; potential increase in grasses and shrub understory may allow for increased lightning-caused wildfires; fire return	Vegetation: effects would be similar to alternative 2 semi-desert grassland. An increase in fine fuels could enhance fire return intervals. Soils: effects would be similar to alternative 2 semi-desert grasslands. Fire and Fuels: fire would remain at current levels; lack of fine fuels inhibits fire spread; fires would continue to be infrequent; FRCC would remain deviated from natural conditions. Wildlife: effects would be similar	Vegetation: effects would be similar to alternative 3 semi-desert grasslands. Soils: effects would be similar to alternative 3 semi-desert grassland. Juniper control treatments leaves soils temporarily susceptible to erosion. Adding slash cover can improve herbaceous cover and reduce erosion potential. Removing smaller trees may help improve soil conditions by improving herbaceous vegetation cover.	Vegetation: effects would be similar to alternative 4 semi-desert grasslands. Soils: effects would be similar to alternative 4 semi-desert grasslands. Fire and Fuels: effects would be similar to alternative 4 semi-desert grasslands. Wildlife: effects would be similar to alternative 4 Sonoran Desert. Recreation: effects would be similar to alternative 4

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Juniper Savannah	<p>interval may move toward desired condition as wildfires would resemble natural fire conditions for this fire regime.</p> <p>Wildlife: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Recreation: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 1 Riparian.</p>	<p>to alternative 2 Sonoran Desert.</p> <p>Recreation: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 2 Riparian.</p>	<p>Fire and Fuels: similar to effects described for alternative 3 semi-desert grasslands.</p> <p>Wildlife: general downward trend in wildlife habitat quality.</p> <p>Recreation: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 3 Riparian.</p>	<p>Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 4 Riparian.</p>
Juniper Woodland	<p>Vegetation: see semi-desert grassland</p> <p>Soils: see semi-desert</p>	<p>Vegetation: see juniper savannah.</p> <p>Soils: see semi-desert grassland.</p> <p>Fire and Fuels: see juniper</p>	<p>Vegetation: same as above.</p> <p>Soils: same as juniper savannah.</p>	<p>Vegetation: see semi-desert grassland.</p> <p>Soils: see semi-desert</p>

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Juniper Woodland	grassland. <i>Fire and Fuels</i> : see juniper savannah. <i>Wildlife</i> : effects would be similar to alternative 1 Sonoran Desert. <i>Recreation</i> : effects would be similar to alternative 1 Sonoran Desert. <i>Heritage/ Archaeology</i> : effects would be similar to alternative 1 Sonoran Desert. <i>Air Quality</i> : effects would be similar to alternative 1 Sonoran Desert. <i>Climate</i> : effects would be similar to alternative 1 Sonoran Desert. <i>Socioeconomics</i> : effects would be similar to alternative 1 Riparian.	savannah. <i>Wildlife</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Recreation</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Heritage/ Archaeology</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Air Quality</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Climate</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Socioeconomics</i> : effects would be similar to alternative 2 Riparian.	<i>Fire and Fuels</i> : see juniper savannah. <i>Wildlife</i> : general downward trend in wildlife habitat quality. <i>Recreation</i> : effects would be similar to alternative 3 Sonoran Desert. <i>Heritage/ Archaeology</i> : effects would be similar to alternative 3 Sonoran Desert. <i>Air Quality</i> : effects would be similar to alternative 3 Sonoran Desert. <i>Climate</i> : effects would be similar to alternative 3 Sonoran Desert. <i>Socioeconomics</i> : effects would be similar to alternative 3 Riparian.	grassland. <i>Fire and Fuels</i> : see juniper savannah. <i>Wildlife</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Recreation</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Heritage/ Archaeology</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Air Quality</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Climate</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Socioeconomics</i> : effects would be similar to alternative 4 Riparian.
Turbinella Oak Chaparral	<i>Vegetation</i> : effects would be similar to alternative 1 semi-desert grassland <i>Soils</i> : effects would be similar to alternative 1	<i>Vegetation</i> : disproportionate use of limited palatable shrubs and grasses can result in less diverse composition. <i>Soils</i> : effects would be similar to alternative 2 juniper woodland.	<i>Vegetation</i> : effects would be similar to alternative 3, juniper woodlands. Disproportionate use of limited palatable shrubs and grasses can result in less diverse composition.	<i>Vegetation</i> : effects would be similar to alternative 4, juniper woodlands. Seasonal grazing could also result in disproportionate use of

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Turbinella Oak Chaparral	<p>juniper woodland.</p> <p>Fire and Fuels: would allow more chaparral acres to succeed to dense brush fields more susceptible to fire.</p> <p>Wildlife: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Recreation: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 1 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 1 Riparian.</p>	<p>Fire and Fuels: not likely to promote or accelerate vegetative treatments beyond what has occurred sporadically in the past.</p> <p>Wildlife: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Recreation: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 2 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 2 Riparian.</p>	<p>Soils: effects would be similar to alternative 3 juniper woodland.</p> <p>Fire and Fuels: densities can be altered by brushing and thinning; not economical to mechanically treat chaparral; strategically placed fuel breaks would target understory brush and small trees, reducing ladder fuels; prescribed burning would move vegetation toward a more natural condition.</p> <p>Wildlife: habitat quality would be stable.</p> <p>Recreation: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 3 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 3 Riparian.</p>	<p>limited palatable shrubs and grasses.</p> <p>Soils: effects would be similar to alternative 4 juniper woodland.</p> <p>Fire and Fuels: effects would be similar to alternative 4 juniper woodlands.</p> <p>Wildlife: effects would be similar to alternative 4 Sonoran desert.</p> <p>Recreation: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Heritage/ Archaeology: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Air Quality: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Climate: effects would be similar to alternative 4 Sonoran Desert.</p> <p>Socioeconomics: effects would be similar to alternative 4 Riparian.</p>
Ponderosa	Vegetation: effects	Vegetation: this vegetation type is	Vegetation: effects would be	Vegetation: effects would

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
Pine and Mixed Conifer	would be similar to alternative 1 semi-desert grassland <i>Soils</i> : effects would be similar to alternative 1 turbinella oak chaparral. <i>Fire and Fuels</i> : lack of prescribed fire could limit openings in dense fuel stands and increase fuel loading. <i>Wildlife</i> : effects would be similar to alternative 1 Sonoran Desert.	not being used on Dagger Allotment so effects there are similar to alternative 1 ponderosa pine/ mixed conifer. On Globe RD allotments, use of preferred understory vegetation is occurring with effects similar to those of alternative 2 turbinella oak chaparral. <i>Soils</i> : effects would be similar to alternative 2 turbinella oak chaparral for grazed areas. Effects would be similar to alternative 1 turbinella oak chaparral for ungrazed areas.	similar to alternative 3 turbinella oak chaparral. Livestock could use all areas of this vegetation type. Effects would be concentrated in openings where palatable forage is more abundant. <i>Fire and Fuels</i> : effects would be similar to alternative 3 juniper woodlands. <i>Wildlife</i> : general downward trend in wildlife habitat quality. <i>Recreation</i> : see Sonoran Desert.	be similar to those described for alternative 2 ponderosa pine/ mixed conifer. Effects would be most pronounced in spring. <i>Soils</i> : effects would be similar to alternative 4 juniper woodlands. <i>Fire and Fuels</i> : effects would be similar to alternative 4 juniper woodlands. Seasonal grazing would allow vegetation to grow during peak seasons, providing ground cover to conduct prescribed fires.
Ponderosa Pine and Mixed Conifer	<i>Recreation</i> : effects would be similar to alternative 1 Sonoran desert. <i>Heritage/ Archaeology</i> : effects would be similar to alternative 1 Sonoran Desert. <i>Air Quality</i> : effects would be similar to alternative 1 Sonoran Desert. <i>Climate</i> : effects would be similar to alternative 1 Sonoran Desert. <i>Socioeconomics</i> : effects would be similar	<i>Fire and Fuels</i> : human activities have resulted in exclusion of fire, causing changes in forest structure and composition. <i>Wildlife</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Recreation</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Heritage/ Archaeology</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Air Quality</i> : effects would be similar to alternative 2 Sonoran Desert. <i>Climate</i> : effects would be similar	<i>Heritage/ Archaeology</i> : effects would be similar to alternative 3 Sonoran Desert. <i>Air Quality</i> : effects would be similar to alternative 3 Sonoran Desert. <i>Climate</i> : effects would be similar to alternative 3 Sonoran Desert. <i>Socioeconomics</i> : effects would be similar to alternative 3 Riparian.	<i>Wildlife</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Recreation</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Heritage/ Archaeology</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Air Quality</i> : effects would be similar to alternative 4 Sonoran

Vegetation Type	Alternative 1 - No Action	Alternative 2 - Current Management	Alternative 3 - Proposed Action	Alternative 4 - Habitat Optimization
	to alternative 1 Riparian.	to alternative 2 Sonoran Desert. <i>Socioeconomics</i> : effects would be similar to alternative 2 Riparian.		Desert. <i>Climate</i> : effects would be similar to alternative 4 Sonoran Desert. <i>Socioeconomics</i> : effects would be similar to alternative 4 Riparian.

Table 4: Comparison of Alternatives by Issue

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Riparian Conditions	Most rapid recovery of vegetation and stream function would occur. Not piping water away from streams and springs for livestock use would facilitate increase in density, cover, and area of riparian vegetation. Improved upland vegetation conditions would reduce runoff effects. Lack of grazing pressure on palatable native vegetation would enhance competition for non-native species, potentially reducing	In areas with sufficient vegetation undesirable effects of grazing would be minimized and riparian areas and stream channels would improve at a slower rate than alternative 1 if riparian utilization guidelines are followed and cattle are moved when use levels are met. Riparian areas lacking key vegetation species have potential to recover if left un-grazed until sufficient vegetation has re-established. Piping water to offsite livestock watering facilities could	Effects would be more pronounced and widespread than alternative 2 with access to Salt River and riparian areas in upper Oak Creek Mesa pasture. Once livestock access Salt River there may be congregation on small beaches, significantly impacting riparian vegetation in a short time. Recovery of native vegetation along Salt River is unlikely even with implementation of	Recovery of vegetation and stream function would be similar to no grazing for key areas. Not piping water away from streams and springs for livestock use would facilitate increase in density, cover, and area of riparian vegetation. Upland vegetation conditions would improve, although somewhat slower than alternative 1, reducing runoff	Limiting use of Salt River corridor to winter season could minimize effects to riparian vegetation although livestock may still browse dormant trees and shrubs if other more palatable forage is not easily available. Herbaceous vegetation may not go dormant at lowest elevations and would likely be grazed. In areas with sufficient vegetation undesirable effects of grazing would be
Riparian Conditions					

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Riparian Conditions	exotic and undesirable vegetation.	reduce potential for vegetation recovery and maintenance through dewatering, but may be beneficial by reducing livestock impacts to stream channels. Troughs located in stream channels reduce potential for recovery.	vegetation management tools due to livestock concentration.	effects. Reduced grazing pressure on palatable native vegetation would enhance competition for non-native species, potentially reducing exotic and undesirable vegetation.	minimized and riparian areas and stream channels should improve at a slower rate than alternative 1 if riparian utilization guidelines are followed and cattle are moved when use levels are met. Riparian areas lacking key vegetation species have potential to recover if left ungrazed until sufficient vegetation has re-established. Piping water to offsite livestock watering facilities could reduce potential for vegetation recovery and maintenance through dewatering, but may be beneficial by reducing livestock impacts to stream channels. Troughs located in stream channels reduce potential for recovery.

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Threatened, Endangered, and Sensitive Species (TES)	Beneficial to habitat quality and overall diversity.	Allows for continued existence of species with available habitats that could increase species range over time. Overall neutral or downward trend in habitat quality for most vegetation types where TES species occur. Some habitat quality benefits may occur from fencing, salting and water development if placed and designed correctly. Density of improvements influences effects. Would meet desired conditions for TES species.	Potential adverse effects to Mexican spotted owl, southwestern willow flycatcher, Chiricahua leopard frog habitat, Blumer's dock, and Arizona bugbane. Overall downward trend in habitat quality for most vegetation types where TES species occur. Some habitat quality benefits may occur from fencing, salting and water development if placed and designed correctly. Density of improvements would influence effects. Vegetation treatments such as prescribed fire, mechanical treatments, and noxious weed treatments would have short-term consequences but overall upward trend	Beneficial to southwestern willow flycatcher, Mexican spotted owl, Chiricahua leopard frog habitat, Arizona bugbane, and Blumer's dock. Proposed reintroduction of special status species would benefit overall biodiversity.	Including conservation measures for southwestern willow flycatcher, Mexican spotted owl, and Chiricahua leopard frog would reduce potential adverse effects to these species. Overall downward trend in habitat quality outside critical habitat. Some habitat quality benefits may occur from fencing, salting and water development if placed and designed correctly. Density of improvements would influence effects. Vegetation treatments such as prescribed fire, mechanical treatments, and noxious weed treatments would have short-term consequences but overall upward trend in habitat quality.

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
			in habitat quality.		
Game and Non-game Wildlife Species	Beneficial to habitat quality and overall diversity.	Overall neutral or downward trend in habitat quality for most vegetation types. Some habitat quality benefits may occur from fencing, salting and water development if placed and designed correctly. Density of improvements influences effects.	Overall neutral or downward trend in habitat quality for most vegetation types. Some habitat quality benefits may occur from fencing, salting and water development if placed and designed correctly. Water development may reduce stopover habitat for migratory birds. Density of improvements would influence effects. Vegetation treatments such as prescribed fire, mechanical treatments, and noxious weed treatments would have short-term consequences but overall upward trend in habitat quality.	Beneficial to habitat quality and overall biodiversity.	Overall neutral or downward trend in habitat quality for most vegetation types. Some habitat quality benefits may occur from fencing, salting and water development if placed and designed correctly. Water development may reduce stopover habitat for migratory birds. Density of improvements would influence effects. Vegetation treatments such as prescribed fire, mechanical treatments, and noxious weed treatments would have short-term consequences but overall upward trend in habitat quality.
Salt River Wilderness	No wilderness grazing would occur and desired conditions would be	Limited grazing in wilderness would continue. Grazing	Expands opportunity for grazing in wilderness to recent	Expands opportunity for grazing in	Expands opportunity for grazing in wilderness to recent

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Salt River Wilderness	met. Potential removal of range improvements would meet Wilderness Opportunity Spectrum (WOS) objectives and Visual Quality Objectives (VQOs).	impacts to scenery are expected to affect forest user recreation experience in uplands. Visible range improvements and grazing impacts may inhibit Forest ability to provide VQOs and WOS objectives. Mitigation recommendations are available in chapter 3. If mechanical equipment is needed to maintain wilderness improvements, separate analysis would need to be completed along with a minimum tools analysis prior to using mechanized equipment.	historic levels. Grazing impacts to scenery are expected to affect forest user recreation experience in uplands and along the Salt River. Visible range improvements and grazing impacts may inhibit Forest ability to provide VQOs and WOS objectives. Mitigation recommendations are available in chapter 3. This analysis would provide NEPA compliance for using mechanized equipment to maintain range improvements. A minimum tools analysis would be required prior to using mechanized equipment.	wilderness to recent historic levels seasonally (winter) but excludes Salt River Corridor. Grazing impacts to scenery are expected to affect forest user recreation experience in uplands. Visible range improvements and grazing impacts may inhibit Forest ability to provide VQOs and WOS objectives. Mitigation recommendations are available in chapter 3. This analysis would provide NEPA compliance for using mechanized equipment to maintain range improvements. A minimum tools analysis would be required prior to	historic levels seasonally (winter). Grazing impacts to scenery are expected to affect forest user recreation experience in uplands and along the Salt River. Visible range improvements and grazing impacts may inhibit Forest ability to provide VQOs and WOS objectives. Mitigation recommendations are available in chapter 3. This analysis would provide NEPA compliance for using mechanized equipment to maintain range improvements. A minimum tools analysis would be required prior to using mechanized equipment.

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
				using mechanized equipment.	
Sierra Ancha Wilderness	No wilderness grazing would occur. Existing range improvements could be removed if the agency determined they were no longer needed.	Limited wilderness grazing could occur in the watershed below sensitive plant populations. Some range improvements could be removed if the agency and permittee determined they were no longer needed. Grazing impacts to scenery are expected to affect forest user recreation experience. Visible range improvements and grazing impacts may inhibit Forest ability to provide VQOs and WOS objectives. Mitigation recommendations are available in chapter 3. If mechanical equipment is needed to maintain wilderness improvements, separate analysis would need to be completed along with minimum tools analysis prior using mechanized	Expands opportunity for grazing in wilderness to recent historic levels. Grazing impacts to scenery are expected to affect forest user recreation experience. Visible range improvements and grazing impacts may inhibit Forest ability to provide VQOs and WOS objectives. Mitigation recommendations are available in chapter 3. This analysis would provide NEPA compliance for using mechanized equipment to maintain range improvements. A minimum tools analysis would be required prior using mechanized equipment.	No wilderness grazing would occur. Existing range improvements could be removed if the agency and permittee determined they were no longer needed.	Expands opportunity for grazing in wilderness to recent historic levels seasonally (winter). Grazing impacts to scenery are expected to affect forest user recreation experience. Visible range improvements and grazing impacts may inhibit Forest ability to provide VQOs and WOS objectives. Mitigation recommendations are available in chapter 3. This analysis would provide NEPA compliance for using mechanized equipment to maintain range improvements. A minimum tools analysis would be required prior using mechanized equipment.

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
		equipment.			
Salt River Wild and Scenic River Designation	Future designation of wild and scenic river status would not be precluded.	Future designation of wild and scenic river status would not be precluded.	Future designation of wild and scenic river status may be precluded through undesirable effects to Outstandingly Remarkable Values. Grazing effects would be challenging to monitor.	Future designation of wild and scenic river status would not be precluded.	Future designation of wild and scenic river status may be precluded through undesirable effects to Outstandingly Remarkable Values.
Salt River Rafting Experience	Limits of Acceptable Change (LAC) at campsites would not be exceeded if livestock are not grazing in the river corridor. A high quality rafting experience would continue.	LAC at campsites would not be exceeded if livestock are not grazing in the river corridor. A high quality rafting experience would continue.	LAC at campsites in Wilderness and Gleason segments may be exceeded if livestock are grazing the river corridor. Forest user perceptions of health and safety may be compromised when occupying river campsites at the same time as livestock.	LAC at campsites would not be exceeded if livestock are not grazing the river corridor. A high quality rafting experience would continue.	LAC at campsites in Wilderness and Gleason segments may be exceeded if livestock are grazing the river corridor after February 15. Forest user perceptions of health and safety may be compromised when occupying river campsites at the same time as livestock.
Water Quality	No significant effects to water quality.	No significant effects to water quality if Best Management Practices are followed.	Water quality standards for Salt River may be impacted by this alternative. Cattle grazing along Salt	No significant effects to water quality if Best Management Practices are followed.	Water quality standards for Salt River may be impacted by this alternative. Cattle grazing along the Salt

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
			River corridor has potential to contribute to impairment of suspended sediment, nitrogen, and e. coli standards		River corridor has potential to contribute to impairment of suspended sediment, nitrogen, and E. coli standards.
Heritage Resources	There would be no direct effects from livestock grazing.	Managed grazing is not considered in and of itself to constitute an effect on heritage resources when the grazing strategy is designed to match herd size with capacity and distribute livestock as evenly as possible across the allotment in order to avoid localized concentrations of animals and the resultant impacts to soils and vegetation associated with intense trampling. Changes in grazing strategy that do not increase grazing intensity or increase stocking rates are likewise not considered to have an effect provided that whatever new strategy is implemented does not alter these	This alternative is likely to result in most heritage resources moving away from desired conditions. Concentrated livestock trampling, range improvement construction, and tool implementation can cause direct impacts to archaeological and historical sites. Mitigation measures described in chapter 2 can reduce or eliminate many effects. Adverse effects can be foreseen if a proposed grazing strategy were to introduce livestock into an area not known to have been grazed historically.	Managed grazing is not considered in and of itself to constitute an effect on heritage resources when the grazing strategy is designed to match herd size with capacity and distribute livestock as evenly as possible across the allotment in order to avoid localized concentrations of animals and the resultant impacts to soils and vegetation associated with intense trampling. Changes in grazing strategy that do not increase grazing intensity or increase	This alternative is likely to result in most heritage resources moving away from desired conditions. Concentrated livestock trampling, range improvement construction, and tool implementation can cause direct impacts to archaeological and historical sites. Mitigation measures described in chapter 2 can reduce or eliminate many effects. Adverse effects can be foreseen if a proposed grazing strategy were to introduce livestock into an area not known to have been grazed historically. They may

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Heritage Resources		conditions. Concentrated livestock trampling and range improvement construction can cause direct impacts to archaeological and historical sites. Mitigation measures described in chapter 2 can reduce or eliminate many effects.	They may also be expected when a grazing strategy proposes shifting to a more intensive system where higher permitted numbers or high intensity/short duration schedules would concentrate livestock into confined areas where either the absolute or relative stock density would cause a significant increase in surface disturbances due to trampling that would be above previous or existing levels.	stocking rates are likewise not considered to have an effect provided that whatever new strategy is implemented does not alter these conditions. Concentrated livestock trampling and range improvement construction can cause direct impacts to archaeological and historical sites. Mitigation measures described in chapter 2 can reduce or eliminate many effects.	also be expected when a grazing strategy proposes shifting to a more intensive system where higher permitted numbers or high intensity/short duration schedules would concentrate livestock into confined areas where either the absolute or relative stock density would cause a significant increase in surface disturbances due to trampling that would be above previous or existing levels.
Air Quality	No significant effects to air quality.	No significant effects to air quality if Best Management Practices are followed.	No significant effects to air quality if Best Management Practices are followed. Smoke management during prescribed fires is mitigated through implementation of	No significant effects to air quality if Best Management Practices are followed.	No significant effects to air quality if Best Management Practices are followed. Smoke management during prescribed fires is mitigated through implementation of ADEQ rules and Best

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Preferred Alternative
Air Quality			ADEQ rules and Best Management Practices identified in project burn plans.		Management Practices identified in project burn plans.
Environmental Justice	No significant effects to environmental justice.	No significant effects to environmental justice.	No significant effects to environmental justice.	No significant effects to environmental justice.	No significant effects to environmental justice.

Chapter 3: Affected Environment and Environmental Consequences

This chapter summarizes physical, biological, social, and economic environments of the project area and effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for comparison of alternatives presented in chapter 2. Vegetative types being analyzed are displayed in appendix A, map 7.

Upland Vegetation/Noxious Weeds

Desired Condition:

Forest Plan

- Provide for grazing of domestic livestock.
- Bring permitted grazing use in balance with forage allocated for use by domestic livestock.
- Improve watershed conditions, range forage, wildlife habitat, and enhance visual quality.
- Maintain a minimum of 30 percent effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30 percent exists, it will be the management goal to obtain a minimum of 30 percent effective ground cover.
- Identify key ungulate forage monitoring areas. These key areas will normally be ¼ mile from water, located on productive soils on level to intermediate slopes and be readily accessible to grazing. Size of the key forage monitoring areas should be 20 to 500 acres. Within key forage monitoring areas, select appropriate key species to monitor average allowable use.
- Through integrated pest management (IPM), manage resources to prevent a build-up of insects and diseases to prevent or reduce serious, long lasting hazards.

Table 5: Management Levels in project area given by Tonto NF Land Management Plan

Level Identifier	Description of Range Management Levels
B	Management controls livestock numbers so that livestock use is within present grazing capacity. Improvements are minimal and constructed only to the extent needed to protect and maintain the range resource in the presence of grazing.
C	Management seeks full utilization of forage allocated to livestock. Cost effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage, and to maintain plant vigor.
D	Management seeks to optimize production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing the multiple use of the range. From all existing range and livestock management technology, practices may be selected and used to develop cost effective methods for achieving improved forage supplies and uniform livestock distribution and forage use. Cultural practices such as brush control, type conversion, fertilization, site preparation and seeding of improved forage species may be used to improve quality and quantity of forage. Cultural practices may be combined with fencing and water developments to implement complex grazing systems and management methods.

Management Level B Locations

5A – Sierra Ancha Wilderness

- Manage for wilderness values, wildlife habitats and natural ecological processes while allowing livestock grazing and recreation opportunities that are compatible with maintaining these values and processes.
- Manage suitable rangelands at Level B to maintain permitted use within forage capacity. Rangeland in less than satisfactory condition will be treated with improved grazing management.
- Minimal range improvements for protection of forage and soil resources commensurate with wilderness values. Maintain utilization at acceptable levels within key forage producing and wilderness use areas.
- Minimal range improvements, i.e., boundary fences and interior division fences deemed essential for Level B management.

2B – Salt River Canyon Wilderness

- The primary emphasis for this area is the preservation of naturally occurring flora, fauna, aesthetics and ecological processes while providing a very high quality white water river running experience.
- Minimal range improvements necessary for Level B management and protection of the forage and soil resources commensurate with wilderness values. Maintain utilization at acceptable levels within key forage producing and wilderness use areas.
- Minimal range improvements, i.e., boundary and essential interior division fences deemed necessary for Level B management. Rangeland in less than satisfactory condition will be treated with improved grazing management.

2C – Upper Salt River Canyon

- The primary emphasis for this area is the preservation of naturally occurring flora, fauna, aesthetics and ecological processes, while providing a high quality white water river running experience.
- Minimal range improvements developed (i.e., boundary fences and interior division fences essential for Level B management). Maintain utilization at acceptable levels within key areas.

6G – Salt River Canyon Wilderness

- Minimal range improvements necessary for Level B management and protection of the forage and soil resources commensurate with wilderness values. Maintain utilization at acceptable levels within key forage producing and wilderness use areas.
- Minimal range improvements, i.e., boundary and essential interior division fences deemed necessary for Level B management.

Management Level C Locations

6F – Roosevelt Lake

- Minimal range improvements necessary for Level C management and protection of the forage and soil resources. Maintain utilization at acceptable levels within key forage producing areas.
- Minimal range improvements, i.e., boundary and essential interior division fences deemed necessary for Level C management.

Management Level D Locations

2F Globe General Management area

- In the pinyon-juniper type manage toward a goal of 25 to 50 percent cover of browse shrubs in key deer wintering areas, planting may be necessary in some areas to restore a seed source.
- Manage the pinyon-juniper type to emphasize the production of mule deer.
- Manage the chaparral type to emphasize the production of whitetail deer.
- Manage suitable rangelands at Level D. Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements.
- Continue monitoring of existing range study plots, and revegetation and brush treatment projects.
- Manage the chaparral type on a 30-year prescribed fire rotation on those sites managed for forage production and water yield.
- Use of approved herbicides on a selective basis where brush encroachment is clearly inhibiting forage production for wildlife and domestic livestock. Possible treatment areas will be identified in allotment management plans and will involve areas of limited size and extent where other management practices (i.e., prescribed burning) cannot be effectively or economically utilized to achieve management objectives. Projects of this nature would be subject to additional analysis and public involvement to ensure project objectivity and public safety.
- Maintenance performed on revegetation acres as determined in allotment management plans to retain optimum forage production. Methods would be appropriate to vegetation and terrain of treatment areas and could include prescribed fire, chemical and/or mechanical means.
- Develop structural improvements in association with AMP to maintain utilization at levels appropriate with management intensity and AMP objectives.
- Study and assess the effects of grazing on the endangered Arizona hedgehog cactus by fencing plots. Correct management conflicts within the range of Arizona hedgehog cactus.

6J Tonto Basin General Management Area

- Continue inspections of existing range study plots and revegetation and brush treatment projects.
- Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements.
- Manage the chaparral type on a 30-year prescribed fire rotation on those sites managed intensively for increased forage production and water yield.
- Use of approved herbicides on a selective basis where brush encroachment is clearly inhibiting forage production for wildlife and domestic livestock. Possible treatment areas will be identified in allotment management plans and will involve areas of limited size and extent where other management practices (i.e., prescribed burning) cannot be effectively or economically utilized to achieve management objectives.
- Maintenance performed on revegetation acres as determined in allotment management plans to retain optimum forage production. Methods will be appropriate to the vegetation and terrain of treatment areas and could include prescribed fire, chemical and/or mechanical means.

- Develop structural improvements in association with AMPs to maintain utilization at levels appropriate with management intensity and AMP objectives.
- Manage the pinyon-juniper type in a sustained yield even-flow basis. Horizontal diversity will be provided by a mix of successional stages within 5,000 acre wildlife management units. Ten percent of the type will be maintained as permanent openings with suitable ground cover for specific site conditions

Best Management Practices and other management objectives: desired conditions for vegetative communities are to:

- Increase density and diversity of native herbaceous species with an ultimate goal of achieving ecosystem potential.
- Increase plant basal area and litter.
- In Sonoran Desert communities, increase cover of biological soil crusts to reduce soil erosion, increase infiltration, and limit spread of exotic annuals (USDI Technical Reference 1730-2 [USDI 2001]).
- In Sonoran Desert communities, increase production of jojoba.
- In semi-desert grassland communities, increase foliar canopy coverage, basal cover, and vigor of native perennial grass species that decrease under grazing pressure.
- In juniper savannahs and woodlands, increase foliar canopy coverage, basal cover, and vigor of native perennial grass species which decrease under grazing pressure.
- In chaparral, increase foliar canopy cover and vigor of shrub species preferred by grazing and browsing animals. These are referred to as “A” species in FSH 2209.21.
- In ponderosa pine and mixed conifer, provide for diversity in age classes of trees and healthy spacing of trees.

Goals for noxious weed management include noxious weed prevention and control practices in the management of grazing allotments. A reduction or elimination of existing noxious weed infestations can be achieved through prevention practices and treatment methods.

For each grazing allotment, include prevention practices focused on preventing weed spread and cooperative management of weeds in annual operating instructions. Prevention practices may include, but are not limited to: altering season of use, exclusion of use, activities to minimize potential ground disturbance, preventing weed seed transportation, maintaining healthy vegetation, weed control methods, revegetation, inspection, reporting, and education.

Maintain healthy, desirable vegetation that is resistant to weed establishment.

Through allotment management plans or annual operating instructions, manage the timing, intensity (utilization), duration, and frequency of livestock activities associated with harvest of forage and browse resources to maintain vigor of desirable plant species and retain live plant cover and litter.

Future management considerations:

Livestock distribution continues to be a challenge in this analysis area as well as most grazing allotments throughout the Tonto National Forest. Recent technological advances in global positioning satellite systems, solar enhanced battery storage, and animal behavior research promises electronic devices that significantly improve rangeland manager’s tools in animal distribution. Electronic devices that are attached to livestock may be coming on market in future

that may significantly replace need for costly conventional wire fencing. Uses of these systems and other yet unknown technologies that enable operators and managers to better manage resources should be incorporated where appropriate and most efficient.

Vegetation Existing Condition and Effects Analysis- Sonoran Desert

Dominant vegetation: little leaf palo verde (*Parkinsonia microphyllum*), cholla (*Cylindropuntia spp.*), saguaro (*Carnegiea gigantea*), brittlebush (*Encelia farinosa*), bursage (*Ambrosia spp.*), crucifixion thorn (*Canotia holocantha*), creosote (*Larrea tridentata*), Mormon tea (*Ephedra spp.*), jojoba (*Simmondsia chinensis*), catclaw acacia (*Acacia greggii*), mesquite (*Prosopis velutina*), shrubby buckwheat (*Eriogonum wrightii*), false mesquite (*Calliandra eriophylla*), turpentine bush (*Ericameria laricifolia*), range ratany (*Krameria spp.*), red brome (*Bromus rubens*), three awn (*Aristida spp.*)

Noxious Weeds: Saharan mustard (*Brassica tournefortii*), Bermuda grass (*Cynodon dactylon*), black mustard (*Brassica nigra*), wild mustard (*Sinapis arvensis*), fountain grass (*Pennisetum setaceum*)

Rangeland management tools that may be used: seeding or planting native vegetation in recovering soils; targeted grazing on nonnative annual grasses when green to reduce fire effects and reduce seed propagation; mechanical, biological or chemical treatment to reduce or remove noxious weeds and reduce fire effects; mechanical treatment to reduce cholla encroachment and improve native vegetation diversity; fencing, water development, salt and or low moisture blocks to distribute livestock across landscape.

Pastures containing Sonoran Desert scrub: Sedow - 4Y; **Hicks-Pikes Peak** - Ortega, Rip, Schute Springs, South Steer, West, Windmill, Yellow, F.S., Hicks, Holly, Hope, Horseshoe Bend, Lower Devore; **Chrysotile**-Boundary; **Haystack Butte** - Cottonwood, River, Upper River; **Poison Springs** - Basset Lake, Intake, Upper Blevens, Blevens, East Highway, Chalk Creek, Baker, Braddock, South Willow, North Willow, Zig Zag, Summit, North Black Mesa, South Black Mesa, Klondike, Summit, Hackberry, West Highway; **Dagger** - Oak Creek Mesa (sparse), Upper Dry Creek, Lower Dry Creek, Upper Coon Creek, Lower Coon Creek, West Devore, Dagger, Rock.

Water developments: wells with windmills or pumps, spring boxes or horizontal wells on active springs, live water in creeks, seasonal water in drainage “potholes,” dirt stock tanks, storage tanks at wells and spring developments with associated pipelines and troughs

In 2010, a national effort was launched to assess the condition of all 6th code watersheds on Forest Service land. Twelve attributes were assessed. Attributes that may be affected by this project are: Water Quality, Water Quantity Condition, Aquatic Habitat Condition, Aquatic Biota Condition, Riparian/Wetland Vegetation Condition, Soil Condition Fire Effects and Regime, Forest Cover, Rangeland, and Terrestrial Invasive Species. The results of the assessment for the 6th code watersheds in the project area are listed in appendix F.

Historic heavy grazing caused hedging on palatable shrub species such as jojoba and reduced species diversity, especially on flatter terrain and in areas near water. Annual forbs and grasses remain somewhat diverse; however, invasive annual species such as red brome have become more prevalent. Perennial grasses are limited to steep slopes. Little recruitment of new perennial vegetation was observed in 2011 during pasture inspections.

Alternative 1 Direct and Indirect Effects

Livestock impacts to Sonoran desert vegetation would be eliminated on Sedow, Hicks-Pikes Peak, Chrysotile, and Haystack Butte, Dagger and Poison Springs allotments.

No grazing provides the most rapid increase of upland vegetative cover, species diversity, and improvement of impaired and unsatisfactory soils condition. As referenced by Allington and Valone (2011), van de Koppel and-Rietkerk (2004) and Castellano and Valone (2007), water supply strongly limits plant growth. Absence of livestock creates an environment conducive to perennial plant recovery; an increase in soil water availability positively creates an environment conducive to perennial plant recovery.

However after fifty years of livestock removal in Sonoran Desert vegetation outside of Tucson Arizona studies have also shown no significant composition change (Blydenstein et al. 1957). Increases were observed in plant density especially in Range Ratany and perennial grasses on the protected site, while density in ragweed decreased under protection from grazing.

Exclusion of grazing can cause a change of species composition and plant communities, usually resulting in the displacement of invasive species by native grasses (Sala et al. 1986). Conversely on western rangelands, areas of high non-native plant invasions livestock can be used as an effective weed control tool through grazing (Frost and Launchbaugh 2003).

Recovery in desert systems can take twenty years or more with only minor improvement in vegetative composition where soil erosion is serious (Holechek et al. 2010). Areas which cross ecological thresholds and are dominated by a single species may require intensive management, in addition to livestock removal to achieve any noticeable change

Livestock removal would eliminate grazing pressure on palatable vegetation except in cases of trespass use. Palatable vegetation would increase in diversity, vigor, root growth and distribution over time. Allington and Valone (2011) conducted grazed and non-grazed studies on Appleton-Whittell Research Ranch in southern Arizona, which demonstrated that higher basal cover and species richness increased on non-grazed sites as compared to grazed sites. Species richness and diversity increased on ungrazed sites.

Conversely, other research suggests improvements in forage production often may not necessarily follow exclusion of livestock grazing in sagebrush semi-desert in Southern Utah (West et al. 1984). This may have similar effects on ecological sites analyzed in this analysis. In addition, cattle grazing of mixed Bermuda grass and tall fescue pastures can be considered a viable strategy to rehabilitate degraded cropland in a viable strategy to rehabilitate cropland in the southwestern United States. Studies have negated the perspective that only non-utilization of land is the best strategy for rehabilitating degraded land (Franzluebbers and Stuedemann 2010).

It is projected that annual forb and cold season grass production increases rapidly with significant winter precipitation. Climatic carbon dioxide levels, temperature and precipitation are leading factors in rangeland species production (Izaurrealde et al. 2011) and would play a role in vegetation recovery. Woody species, annual grasses, cool season perennial grasses and forbs tend to increase with rising carbon dioxide levels. Conversely, warm season bunchgrasses may decrease.

Rapid recovery in concentrated livestock use areas (i.e., around stock tanks, corrals, trailing corridors) may not occur. Rates of recovery depend on many factors including climate, current soil condition, fire, recreational impacts, and wildlife use.

Removal of livestock may reduce spread of acacia and mesquite because cattle are highly effective agents of dispersal (Browning and Archer 1988). If a population occurs in uplands, spread continues naturally. Livestock have already established a seed bank where, without livestock, germination and growth is uninhibited (Browning and Archer 2011). In the absence of livestock, drought may reduce grass species, especially bunchgrasses due to water levels dropping below their infiltration threshold (Castellano and Valone 2007), which may result in potential shift to a shrub dominated state.

Jojoba shrubs show higher rates of vigor and seed production when ungrazed, compared to grazed areas. Seedlings in sheltered areas have higher survival rates than those greatly exposed to climatic extremes and rodent predation (Sherbrooke 1977). Results of a study conducted on nearby National Park Service lands indicate high presence of jojoba seedlings under existing mature vegetation with high surface litter presence. An appropriate level of seedling recruitment for viable population sustainability is unknown.

In the absence of livestock grazing, noxious weed seed spread by domestic animal coats and consumption would be eliminated or reduced. However, seeds would continue to be transported by wildlife, natural forces, and recreational activities.

Without livestock disturbance, biological crusts would form more rapidly, reducing ability of noxious and invasive weed seeds to germinate and increase water infiltration. Studies in the Great Basin found presence of biological crusts inhibited growth of cheatgrass (*Bromus tectorum*), an annual exotic grass related to red brome, but did not affect germination of native grasses (Sheley and Larsen 1995). Type of moss forming biological crusts is an important factor on the level of inhibited growth on species.

Removal of fences and gates allows uninhibited flow of traffic throughout the project area; however, a lack of maintained range improvements may also limit water available to recreational users and for recreational livestock.

Saguaro seedling establishment increases with reduced use and trampling of nurse plants by livestock (Martin and Turner 1977). Protection highly encourages seedling establishment and growth. In protected areas, studies show a 200 percent increase of establishment (Turner and Bowers 1988 [FEIS])

Cumulative Effects

Heavy historic grazing, especially around the late 1800s and early 1900s has left a lasting impression across western rangelands. Stocking rates have declined markedly since the early 1900s with adoption of basic tenets of rangeland management. Livestock numbers declined with adjusted carrying capacity from noticeable shifts in vegetation composition.

Secondary results include loss of soil fertility and water holding capacity (Asner and Archer 2010). Without livestock grazing, recovery would be varied especially with changes in climatic carbon dioxide and temperature and precipitation fluctuations, which affect soil and vegetation response. Some site-specific studies do show that light to conservative grazing benefits grass plants during times of drought as compared to no grazing (Holechek et al. 2006). Intermediate

levels of grazing may maintain greater levels of native plant diversity as compared to the removal of grazing as shown in a study in cheat grass dominated sites which has some similarities to red brome in Arizona (Loeser et al. 2006).

Trespass cattle access Forest Service lands through Salt River corridor and from adjacent allotments. Without livestock operator presence and a decrease in Forest Service monitoring, trespass cattle populations may increase, becoming wild and potentially harmful to forest visitors and forest resources.

Haystack Butte special use permit for headquarters to maintain that allotment would be cancelled since a headquarters would no longer be necessary. Headquarters Spring may be affected as part of rangeland improvement projects.

Unauthorized off road vehicle activities and user created roads would continue to increase, affecting soil compaction and erosion. Removal of livestock reduces one vector of soil compaction and erosion. A reduction in permittees and Forest Service personnel for purposes of range administration results in equal reduction in unauthorized off-road notifications, potentially increasing soil erosion and compaction.

Climate change and drought affects vegetation response and growth with or without presence of livestock. Quicker recovery is possible in areas where a seed source or diverse species are present. Without grazing pressure, plants show higher vigor, increased root and seed production. An increase of tree, shrub, grass, subshrub and forb cover would increase carbon sequestration.

Effects of rangeland grazing systems are geographically widespread and are thus likely a larger contributor to changes in the global carbon cycle. Decreased vegetative cover can lead to desertification in response to grazing, removing these carbon stocks increases wind and water erosion accelerating the loss of potential carbon sequestration (Asner and Archer 2010).

Salt River Wilderness contains range improvements scattered throughout the project area. Range improvement removal may enhance wilderness visual quality while others may appreciate the rustic look of wilderness range improvements. Currently, with proper clearances, permittees within project area may enter wilderness in vehicles to maintain improvements. Without livestock, roads accessing improvements should be closed, reducing unauthorized use.

Surrounding allotments are scheduled for future allotment analysis where grazing and associated actions would be analyzed. Vegetation in the project area would continue to receive use by wildlife, insects, unauthorized livestock, and be influenced by human activities such as harvesting, pruning under power lines, mining and mineral exploration, introduction and spread of noxious weeds, and off-road travel. Climatic conditions would ultimately determine rates of growth and reproduction for all Sonoran Desert species, influencing the degree to which this vegetation type would move toward desired conditions.

Removal of domestic livestock grazing would subtract one vector of transportation for weed propagules from a list of many natural and human-related vectors, such as wind, wildlife, vehicular travel, and hikers. A no grazing alternative may reduce the number of new weed infestations and spread of existing infestations in all vegetation types. Intermediate levels of grazing have also been known to maintain greater levels of native plant diversity as compared to removal of grazing as shown in a study of a cheatgrass-dominated site which shares similarities with red brome infested sites in Arizona (Loeser et al. 2007).

Past heavy off road vehicle use, especially on Sedow Allotment, has increased soil disturbance and changed vegetation type. Past mechanical work in this area has tried to restore the area with little effect. Removing livestock may slightly improve conditions at this specific location.

Alternative 2 Effects

Heavy browsing greatly reduces shrub size and forage yield, but moderate browsing results in yields similar to ungrazed plants (NRCS Plants Database 2008; Roundy et al. 1989). Browsing of jojoba by deer and cattle could be severe enough to prevent fruit development and leaders may be consumed faster than they grow (NRCS Plants Database 2008 and [FEIS]). A study conducted on Tonto Basin Ranger District's Campaign Allotment demonstrated jojoba's tolerance of browsing by cattle. Jojoba initiated new twigs from lateral buds to compensate for the loss of apical buds and twigs. Plants at lowest elevations on Dagger, Poison Springs and Hicks-Pikes Peak are hedged from high historical use and often occur in areas of compacted soils.

Studies considering woody perennial Sonoran Desert species demonstrate that climate and elevation are more responsible for diversity and density than livestock grazing (Hall et al. 2005). Perennial grass survival is also more dependent upon climatic factors; however, some studies indicated that grasses were more vigorous when grazing pressure occurred during dormancy (Hall et al. 2005).

Livestock affect saguaro seedling establishment by trampling under nurse plants (particularly mesquite and palo verde) and through herbivory (Martin and Turner 1977). Saguaro seedling establishment is slow and highly dependent upon temperature, rainfall (soil moisture), and herbivory by insects. Microsites (nurse plants) are important for regulating temperature and providing shade essential for saguaro establishment. Reduction of multi-storied canopy layers reduces litter, understory cover, and nurse plant cover (Hall et al. 2005, FEIS).

Livestock grazing tramples soil crusts, which reduces crust cover, frequency biomass, species richness and diversity, and ecological function (Hall et al. 2005). Biological soil crusts in the Sonoran Desert influence nutrient cycling, nitrogen fixation, and nutrient availability to plants; seedling germination and vascular plant growth; water infiltration and runoff; and soil stabilization and erosion. Biological crusts, depending on type of moss, inhibit germination of cheatgrass (Sheley and Larsen 1995). As trampling continues, biological crusts may no longer inhibit growth of similar species such as red brome.

Rangeland management research indicates conservative or moderate livestock use may result in plant vigor and landscape similar to an absence of livestock grazing (Holechek et al. 1999, Navarro et al. 2002, Loeser et al. 2007). These studies do not specify whether soils and vegetation being influenced by livestock grazing pressure were in satisfactory condition or some form of impaired condition (i.e., compaction, limited diversity) when the studies began. Climatic carbon dioxide levels, temperature and precipitation are leading factors influencing rangeland species production (Izaurrealde et al. 2011). Stocking rates, timing and frequency must be assessed based on bimodal, localized precipitation patterns and frequent regional drought events.

False mesquite displays grazing effects quickly. Changes in growth form from vertical to prostrate is common when the species receives moderate or higher grazing pressure. False mesquite produces good quality browse in early spring following adequate winter precipitation and is often available before the onset of perennial grasses. It has a tendency to become dormant in early summer when precipitation is scarce, but will become productive again following

adequate moisture from summer monsoon rains. False mesquite can withstand aggressive grazing pressure and often becomes the dominant forage plant on the landscape when perennial grasses have been removed (U.S. Forest Service 1988).

Range ratany is browsed, affecting vigor and future species recruitment. Range ratany produces high quality browse in spring and summer months. According to the FEIS database, this species has a high tolerance for hedging and fair to good palatability for livestock, with grazing tolerance at 50 percent or less. Studies show conflicting information about species recruitment; there may be a locally genetic manipulation.

Shrubby buckwheat is intolerant of hedging and often decreases in abundance under grazing pressure. It is used by livestock and has medium palatability, slow growth rate and an ability to re-sprout.

Various species of spring annuals are preferred by livestock when adequate winter moisture and soil warmth occur, usually March through April. Tonto Basin Ranger District pasture inspections indicate grazing pressure on accompanying shrubs is reduced while annuals are actively growing. Once annuals begin to cure, use of palatable shrubs in those areas begins to increase, as the shrubs are typically experiencing new growth and flower production resulting from winter moisture. Selection by livestock of more palatable annual forbs and grasses over those less palatable could lead to a reduction in species richness and diversity, although to what degree is unknown. Grazing annual forbs and grasses led to changes in composition of annual plant communities, documented in a two-year study on grazed versus un-grazed desert sites (Waser and Price 1981). Sites became dominated by a few annual species, while those species considered relatively rare tended to drop out of grazed sites.

Limited water developments, terrain, timing of use, and large pastures currently create uneven livestock distribution. Installation of new rangeland developments awaits NEPA analysis. Livestock trailing occurs, especially to and from water developments, salt and bedding areas. Heavier trailing occurs in areas where distribution is uneven.

Maintenance and installation of water developments currently utilizes above ground pipelines, potentially increasing temperature of water in troughs. Above ground pipelines exposed to high temperatures and direct sunlight, when not charged with water, may speed breakdown of pipe material. Some water developments currently provide water to wildlife. Livestock and wildlife species compete for palatable forage. Federal, state, and local contracts would be maintained under this alternative, providing water for wildlife and improved management possibilities for livestock operators.

Noxious weeds may become more common where native plant competition is reduced due to grazing pressure. Livestock grazing would continue to contribute to transport and spread of unpalatable noxious and invasive weeds. A reduction in some palatable noxious and invasive weeds would continue under this alternative, potentially reducing fine fuel fire hazards. Implementation of alternative 2 does not significantly contribute to the Forest's existing noxious weed problem.

Red brome and filaree (*Erodium cicutarium*) are opportunistic exotic species, early spring germinators that are spread through cattle grazing and attachment of seeds to animal coats. Temperature, precipitation, and elevation are primary drivers of germination. Red brome has a short window of grazing opportunity before seed heads form and attach to animals or blow in

wind. Filaree is desired by livestock in early spring, after which it forms seed heads and burrows into animal coats or soil.

Livestock browsing can spread acacia, mesquite, and other species requiring scarification by grazing during active seed set. Past grazing during these time frames, have established a seedbank where germination and establishment continues. Newly established species are currently grazed, reducing the number of plants reaching maturity. Drought and livestock grazing practices can lower water tables to favor shrubs rather than grasses (Castellano and Valone 2007).

Terrain would continue to create uneven livestock distribution. Many portions of the project area have slopes greater than 40 percent and are typically not utilized by livestock, increasing pressure on slopes less than 40 percent (appendix A, map 8).

Alternative 2 Cumulative Effects

See alternative 1, Cumulative Effects.

Biological crusts are affected by cattle grazing and mechanical disturbances from off-road vehicles. Compaction and erosion would continue to affect soil conditions as a result of off road vehicles and cattle grazing.

Cattle act as a vector for the transportation and seed dispersal of noxious weeds. Disturbance caused by cattle grazing would increase the likelihood of noxious weed establishment.

Limited accessibility in designated wilderness areas would continue to limit management options available to livestock producers. With proper authorization, machinery can be operated in the wilderness to maintain range improvements.

Surrounding allotments are scheduled for future allotment analysis where grazing and associated actions would be analyzed. Vegetation in the project area would continue to receive use by wildlife, insects, unauthorized livestock, and be influenced by human activities such as harvesting, pruning under power lines, mining and mineral exploration, introduction and spread, and off-road travel. Climatic conditions will ultimately determine rates of growth and reproduction for all species, influencing the degree to which this vegetation type would move toward desired conditions. In 2012, a decision approved installation of a new pipeline and fence in Sedow Allotment, which slightly increased water distribution and created a new pasture.

Rangelands are adversely affected by drought regardless of condition, but fair, poor or very poor condition is more adversely affected and recovers slower than rangelands in good or excellent condition (Howery 1999). With improved range conditions there is usually adequate cover (vegetation, litter) to prevent accelerated soil erosion. Higher range condition rating indicates a higher diversity of plants that possess different growing seasons (warm and cool season) and rooting habits (shallow, medium, and deep rooted plants). Increases in opportunities for plant communities to exploit various temperatures and soil moisture regimes that occur across arid and semi-arid rangelands, is one benefit of diversity. Better soil stability improves capacity of range sites to retain soil moisture and grow the kinds and amounts of plant species they are capable of producing (Howery 1999).

Hotter temperatures, especially during longer periods of time, affect livestock body score. This reflection is related to type and breed of livestock grazed. Climate change is predicted to increase air warming temperature from 34° F to 43.5 F°, a range of conservative to extreme predictions.

Increased air temperature affects ground temperatures, causing more extreme weather patterns from longer more frequent droughts to larger more intensive precipitation events. It is assumed health of livestock is affected by temperature related illnesses, diseases, resistance, feed and water shortages, and food borne illnesses (Nardone et al. 2010). Animals acclimate to heat stress by reducing intake which affects other bodily functions. If an animal is exposed to heat for extended periods of time, body condition may suffer.

Alternative 3 Effects

See alternative 2 Effects.

Flowers and beans of catclaw acacia, mesquite, palo verde, and mimosa (*Mimosa spp.*) would continue to be utilized, potentially increasing seed propagation. These species are palatable and desirable to livestock when new growth, flowers, and beans are being produced in late spring and early summer following adequate winter precipitation. Mesquite and acacia grazed during the height of seed production increases seed dispersal (Steinburg, Peter; FEIS 2001 and Gucker, Corey, FEIS 2005). In years of low precipitation or during hot summer months, these plants often become dormant and retain only a minimum cover of leaves.

Studies considering woody perennial Sonoran Desert species demonstrate that climate and elevation are more responsible for diversity and density than livestock grazing (The World Conservation Union et al. 2005). Perennial grass survival are also more dependent upon climatic factors for survival however some studies indicated that grasses were more vigorous when grazing pressure occurred during dormancy (The World Conservation Union et al. 2005).

Proposed water developments would be dependent on water availability through springs and wells. Where water is not available, livestock distribution would continue to be uneven. New proposed fencing would decrease pasture size, reducing uneven distribution in larger pastures and potential overutilization of riparian areas.

Grazing/ browsing above 40 percent utilization to reduce seed propagation of nonnative herbaceous plants and reduce density of woody plants: direct and indirect effects would accrue at a higher intensity as those effects described above. Reduction of undesirable species may allow desirable species to increase in abundance. Desirable species may experience undesirable effects during treatment as livestock will select for desirable species while consuming targeted species.

High intensity/ short duration grazing (above 40 percent utilization): can be used to remove fine annual grass fuels that promote fires in an ecotype that historically didn't have fires. This type of grazing may create intensified short-term effects as described above within treatment areas.

Fencing/ herding to improve livestock distribution: Could be used to reduce the grazing pressure in areas where livestock concentrate. Direct effects: complete removal of vegetation to install and maintain fences. Localized vegetation damage/removal and associated erosion can lead to invasion of noxious weeds. Mitigation measures can most often limit this source of weeds, especially if these sites are regularly monitored for presence of weeds. If mitigation measures for ground-disturbing projects are followed, there are no other positive or negative effects. Indirect effects: reduces concentration of cattle in preferred sites and may create more even vegetation use across the landscape.

Water development: Direct Effects: removal of vegetation would exceed 40 percent within ¼ mile of water developments. Complete removal through grazing and trampling of forbs and grasses is

common immediately adjacent to concentrated water sources such as troughs or stock tanks. Indirect effects: reduces concentration of grazing use on vegetation by cattle across the pasture by providing multiple water sources for cattle to travel between. Development may reduce plant vigor and diversity in areas accessible to cattle due to development of closer water sources. Vegetation adjacent to developed spring sources may diminish or die if all or most of the water is removed and stored in tanks and troughs.

Erosion control structures: Direct effects: vegetation removal and trampling for the construction of erosion structures. Indirect effects: increased vegetation growth as a result of decrease in erosion and stabilizing of soils.

Seeding/ planting native vegetation in recovering soils: Direct effects: planting increases cover of palatable vegetation. Indirect effects: species diversity shifts to include more desirable vegetation cover and less undesirable vegetation cover; undesirable species not treated may increase in cover.

Salt and/or low moisture blocks to distribute livestock: Direct effects: Removal of vegetation would be intensified within ¼ mile of salt placement. Complete removal through grazing and trampling of forbs and grasses is common immediately adjacent to salt and mineral sources. Indirect effects: Reduces concentration of grazing use on vegetation near water sources by encouraging cattle to search out salt and mineral supplements they need.

Noxious weed and invasive plant removal/ reduction through mechanical, chemical, biological and fire treatments: Direct effects: chemical and biological treatments reduce cover of undesirable vegetation. Indirect effects: biological controls may target species not originally intended for treatment. Removal of invasive plants would facilitate a more diverse ecosystem.

Alternative 3 Cumulative Effects:

See alternative 1 and 2 Cumulative Effects.

Improved water developments and properly maintained pasture divisions can increase distribution but livestock would tend to concentrate on flatter terrain and near surface water. Many of these areas already exhibit impaired soil and vegetation conditions and proper use levels may be met quickly with concentrated use. Changes in management would be necessary if proposed range improvements, herding and salting are not effective in distributing animals across the landscape.

Limited accessibility to range improvements in designated wilderness areas currently limits management options available to livestock producers. This alternative proposes to use mechanized equipment to maintain certain improvements in wilderness areas (table 2).

Research indicates livestock grazing affects climate through emissions of methane gas produced by cattle (Gill et al. 2010). Continued grazing contributes to methane gas produced worldwide. It is difficult to pinpoint methane produced by livestock, since it depends on amount and type of feed intake (McGinn et al. 2011). Studies conducted in the last ten years suggest higher greenhouse gas emissions from cow-calf operations rather than feedlots. For the United States beef herd, Johnson, et al. (2003), as phrased by McGinn et al. (2011) found cow-calf operations accounted for 75 percent of greenhouse gas emissions, totaled from all beef production. In Canada in 2010, 84 percent of the nation's beef production greenhouse gas emissions were from cow-calf operations (Beauchemin et al. 2010). Most studies focus on grazing animals on irrigated

pasture rather than rangelands, which would present differing vegetation choices. Studies also may not highlight the indirect effects of forage production for feedlot systems.

Grazing/browsing above 40 percent utilization to reduce seed propagation of nonnative herbaceous plants and reduce density of woody plants would accelerate soil erosion leading to lower plant recruitment and a decrease in nutrient cycling; this would have a degrading effect on soil conditions limiting further vegetative growth and establishment.

Fencing/herding to improve livestock distribution homogenizes use across the landscape can decrease overall plant community diversity.

Water development: removal of water for livestock grazing can lower water tables which reduce available water for plants.

Erosion control structures provide soil stabilization through an increase in vegetative cover.

Seeding/planting native vegetation in recovering soils provides species diversity and cover trends toward desired conditions. This tool could be used to plant native vegetation that may have been present historically, but has since been removed due to environmental factors or past management. Species that may be planted include, but are not limited to; saguaro, ocotillo (*Fouquieria splendens*), mesquite, palo verde, and prickly pear (*Opuntia* spp.).

Salt and/or low moisture blocks to distribute livestock: incorporation of salt into the surrounding soil can prevent plant growth in the immediate area. This can build up over time and has a more pronounced effect if the same location is used year after year.

Noxious weed and invasive plant removal/ reduction through mechanical, chemical, biological and fire treatments create vegetation trends toward desired conditions. Species that may be removed include but are not limited to: camelthorn (*Alhagia maurorum*), sweet resin bush (*Euryops multifidus*), yellow star thistle (*Centaurea solstitialis*), Malta star thistle (*Centaurea melitensis*), red brome, rip-gut brome (*Bromus diandrus*), fountain grass (*Pennisetum setaceum*), Saharan mustard (*Brassica tournefortii*) jumping cholla (*Cylindropuntia fulgida*) and buffelgrass (*Pennisetum ciliare*).

Alternative 4 Effects

See alternative 1 and 2 Effects for general grazing effects.

Winter and spring flexible stocking rates and ability to quickly move livestock in response to changing conditions is a best management strategy. Conclusion of a literature search by World Conservation Union (2005) states “continuous grazing in which livestock are maintained within fenced allotments yearlong is not a feasible grazing management strategy on Sonoran Desert public lands.”

Perennial grass survival is also more dependent upon climatic factors for survival however some studies indicated that grasses were more vigorous when grazing pressure occurred during dormancy (The World Conservation Union et al. 2005). Studies considering woody perennial Sonoran Desert species demonstrate that climate and elevation are more responsible for diversity and density than livestock grazing (The World Conservation Union et al. 2005).

Installation of wells, proposed fencing of key reaches and other riparian areas, and new pasture fence lines often decrease overall grazing pressure during winter and spring in uplands. New proposed water developments would still be dependent on water availability through wells. Where water is not available, livestock distribution would be uneven. New proposed fencing would decrease pasture size, reducing uneven distribution in larger pastures.

Winter grazing may increase browsing and foraging on some winter growing plant species.

Cattle may benefit from management prescriptions that optimize forage and production except where those prescriptions limit grazing to reduce livestock and wildlife competition for forage.

An increase in vigor and diversity of warm season forbs, grasses, subshrubs, and shrubs is more likely with a winter and spring grazing period. Growth and vigor of jojoba would potentially increase with reduced livestock grazing pressure. Increased shrub production may promote saguaro establishment.

Perennial grass survival is more dependent upon climatic factors for survival; however, some studies indicated that grasses were more vigorous when grazing pressure occurred during dormancy (Hall et al. 2005). Studies considering woody perennial Sonoran Desert species demonstrate that climate and elevation are more responsible for diversity and density than livestock grazing (Hall et al. 2005).

Jojoba, mesquite and palo verde would receive lighter grazing pressure, reducing trampling which may positively increase saguaro establishment, and decrease seed spread through herbivory. Mesquite and palo verde produce in late spring and early summer following adequate winter precipitation. According to Martin and Turner (1977) livestock may slightly affect saguaro seedling establishment. Saguaro seedling establishment is slow and highly dependent upon temperature, rainfall (soil moisture), and herbivory by insects. Microsites (nurse plants) are important for regulating temperature and providing shade essential for saguaro establishment.

Winter and spring season grazing may cause slight undesirable effects to soil crusts through trampling, but less than yearlong grazing, which reduces crust cover, frequency biomass, species richness and diversity, and ecological function (Hall et al. 2005).

Flowers and beans of catclaw acacia, mesquite, palo verde, and mimosa (*Mimosa spp.*) would continue to be utilized early in the growing season, potentially increasing seed propagation.

Cumulative Effects

See Cumulative Effects as described for alternatives 1 to 3.

Vegetation Existing Condition and Effects Analysis- Semi-desert Grassland

Dominant vegetation: mesquite, catclaw acacia, cholla, prickly pear (*Opuntia*), mimosa (*Mimosa biuncifera*), shrubby buckwheat, range ratany, false mesquite, snakeweed (*Gutierrezia sarothrae*), black grama (*Bouteloua eriopoda*), side-oats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), three awn, curly mesquite (*Hilaria belangeri*), globe mallow (*Sphaeralcea spp.*)

Noxious weeds: Malta star thistle.

Rangeland management tools that may be used: light to conservative grazing to maintain or improve diversity of native species and reduce nonnative annual grasses; grazing to reduce seed propagation of nonnative plants; mechanical, biological or chemical treatment to reduce or remove noxious weeds; mechanical or fire treatment to reduce cholla encroachment and improve native vegetation diversity; fencing and water development, salt and or low moisture blocks to distribute livestock across landscape; seeding or planting native vegetation in recovering soils.

Pastures containing semi-desert grassland: **Sedow-** Bronson, Horse; **Hicks-Pikes Peak-** West, Kenny, Big, Lower Devore, Upper Big, South Steer, Holly, Windmill, North Steer, Ortega, Hope, Horseshoe Bend, Lower Shute Springs, Upper Shute Springs; **Chrysotile-** Tony, Boundary, Jackson, Ash Creek, Regal, 72, Poverty; **Haystack Butte-** River, Steer, Cottonwood, Upper River, Bronson; **Poison Springs-** Upper Blevens, Chalk Creek, Baker, South Willow, North Willow, Klondike, South Black Mesa, North Black Mesa, Hackberry;

Dagger- Oak Creek Mesa, Upper Dry Creek, Lower Dry Creek, Upper Coon Creek, Lower Coon Creek, West Devore, Dagger, Rock, Ellison, North Sheep, Little Sheep.

Water developments: wells with windmills or pumps, spring boxes or horizontal wells on active springs, live water in creeks, seasonal water in drainage “potholes,” dirt stock tanks, storage tanks at wells and spring developments with associated pipelines and troughs

Much of this vegetation type is shrub-dominated with observed increases in shrub cover over recent decades. Perennial grasses are diverse, especially on steep slopes and in areas furthest from available livestock water. Curly mesquite is the most common grass species. Invasive annual grasses such as red brome are common, greening in early spring and persisting in a cured state for several months. Historic heavy grazing has left residual impacts to vegetation in flatter terrain. Current heavy grazing on ridge tops, in saddles, and adjacent to water developments limits vegetation recruitment and forage production at those sites. Palatable species are often more common and vigorous when growing in the protection of less palatable shrubs, trees, and cacti where soils are looser, organic material is more abundant, grazing pressure is lessened, and moisture may persist. Moderate departure from biotic integrity is widely observed in this vegetation type. Downward trend in vegetation and soils conditions as observed through Parker 3-step monitoring occurs in some locations.

Alternative 1 Effects

Many of the effects described under Sonoran Desert in this alternative would also apply in semi-desert grasslands, except where the effects are specific to Sonoran Desert vegetation such as the effect to saguaro seedling establishment.

Alternative 2 Effects

See effects as described under alternative 2, Sonoran Desert, except for effects to saguaro.

Continued grazing pressure may likely continue decreasing species like grama grasses and increase opportunistic species such as curly mesquite and three-awn. Warm season perennial grasses such as curly mesquite and three-awn will become productive following not only summer monsoonal moisture but spring moisture as well. Grama species should receive very light grazing pressure during periods of rapid growth, which typically follow summer monsoon rain events. Growth points are higher above ground and more susceptible to grazing pressures, which require more energy to regrow during this time. They can then be grazed more aggressively following

seed set in the fall and winter months with little undesirable effect. Curly mesquite should be protected from use during key growth periods to facilitate seed set and stolon production, which can help stabilize loose soils (U.S. Forest Service 1988).

Alternative 2 Cumulative Effects

See effects described for alternative 2, Sonoran Desert, except for effects to saguaro.

Trespass cattle affect usable forage and may force authorized cattle to be limited in pastures uses based on use limits. It is difficult to distinguish unauthorized cattle use from authorized cattle use.

Alternative 3 Effects

See effects described for alternative 3, Sonoran Desert, except for saguaro and for alternative 2 for perennial grasses.

Grazing/ browsing above 40 percent utilization to reduce seed propagation of nonnative herbaceous plants and reduce density of woody plants: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

High intensity/ short duration grazing: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Fencing/ herding to improve livestock distribution: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Water development to improve livestock distribution: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Erosion control structures: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Seeding/ planting native vegetation in recovering soils: Can be used to plant native vegetation that may have been present historically, but has since been removed due to environmental factors or past management. Species that may be planted include but are not limited to: curly mesquite, three-awn, side oats grama, squirrel-tail (*Elymus elymoides*), globe mallow, black grama, and hairy grama.

Salt and/or low moisture blocks to distribute livestock: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Noxious weed and invasive plant removal/ reduction through mechanical, chemical, biological, and fire treatments: Species that may be removed include, but are not limited to Camelthorn, yellow star thistle, Malta star thistle, red brome, ripgut brome, Lehmann's lovegrass (*Eragrostis lehmanniana*), fountain grass, Saharan mustard, and buffel grass.

Fuels reduction (prescribed fire and mechanical methods): Reduces upland fuel loads that are typically associated with intense crown fires that are stand replacing and result in increased runoff that can wash out creeks and drainages along with their associated riparian ecosystems. This treatment could be used to remove encroaching brush to maintain a grass-based vegetative cover.

Cumulative Effects

See cumulative effects for alternative 3, Sonoran Desert.

Many historic adits hit underground water sources, which have been used by livestock operators for additional water sources. The proposed action would continue to utilize these sources and potentially develop more breached underground water sources, possibly depleting ground water and affecting riparian surface flow.

Alternative 4 Effects

See effects as described for alternative 4, Sonoran Desert.

Cattle distribution may decrease slightly with removal of live watering locations from fenced key reaches. Installation of wells, away from fenced key reaches may offset decreased cattle distribution by adding additional watering sources.

Studies show that including grazing in parts of a landscape may contribute to an increase in plant diversity and habitat fragmentation that can benefit wildlife. Cattle alter composition of plant communities and, when used properly, can alter habitat structures to enhance wildlife populations (Vavra 2005).

Cumulative Effects

See cumulative effects as described for alternative 4, Sonoran Desert.

Vegetation Existing Condition and Effects Analysis- Juniper Savannah

Dominant vegetation: alligator juniper (*Juniperus deppeana*), redberry juniper (*Juniperus coahuilensis*), sotol (*Dasylirion wheeleri*), skunkbush sumac (*Rhus trilobata*), beargrass (*Nolina microcarpa*), hairy grama, curly mesquite, squirreltail (*Elymus elymoides*), side-oats grama

Noxious weeds: silver leaf nightshade (*Solanum elaeagnifolium*)

Rangeland management tools that may be used: light to conservative grazing to maintain or improve diversity of native species and reduce nonnative annual grasses; grazing to reduce seed propagation of nonnative plants; mechanical, biological, or chemical treatment to reduce or remove noxious weeds; mechanical or fire treatment to reduce cholla encroachment and improve native vegetation diversity; fencing and water development, salt and or low moisture blocks to distribute livestock across landscape; seeding or planting native vegetation in recovering soils, use of managed or wildland fire to move vegetation towards desired conditions.

Pastures containing juniper savannahs: Sedow- 4Y, Bronson, New Corral, Hess, Brushy, Monument, Steer, Rock Springs, Reveg, Storm Canyon, Walnut, Sevenmile, Indian Gardens, Home Horse, Hudson ; **Hicks-Pikes Peak-** Hope, Horseshoe Bend, Upper Shute Spring, Windmill, South Steer, Lower Devore, Holly, Hicks, Murphy, West, Kenny ; **Chrysotile-** Boundary, Ash Creek, 72, Tony, Timber, Home, Poverty, Syrvey, Jackson, Horse #1, #2, #3; **Haystack Butte-** River, Cottonwood, Upper River, Steer, Bronson, Breeding; **Poison Springs-** Upper Blevens, Baker, South Willow, North Willow, Klondike, Hackberry; **Dagger-** Oak Creek Mesa, Upper Coon Creek.

Water developments: wells with windmills or pumps, spring boxes or horizontal wells on active springs, live water in creeks, seasonal water in drainage “potholes,” dirt stock tanks, storage tanks at wells and spring developments with associated pipelines and troughs.

Current vegetative condition is similar to that described for semi-desert grasslands. Increasing cover by juniper species and other shrubs has been documented for many years. Historic and

current impacts to vegetation by livestock grazing are similar to those described for semi-desert grasslands.

Alternative 1 Effects

Effects of this action may also be described under the above vegetation types.

Livestock impacts to juniper savannahs and woodlands would be eliminated on Sedow, Hicks-Pikes Peak, Chrysotile, and Sedow allotments. Without livestock, an increase of grasses could occur, allowing fire to easily move through landscape, reducing establishment of juniper stands. Under a no grazing alternative, recovery is dependent on climatic carbon dioxide, temperature and precipitation fluctuations.

Cumulative Effects

Vegetation in watersheds outside the project area would continue to experience livestock grazing pressure. Vegetation in the project area would continue to receive use by wildlife, insects, unauthorized livestock, and be influenced by human activities such as harvesting, pruning under power lines, mining and mineral exploration, noxious weed introduction and spread, and off-road travel. Additionally, fuels treatments in this vegetation type are a cumulative effect to vegetation. An increase in fine fuels from the removal of grazing pressure could shorten the fire return interval.

Removal of livestock would increase fine fuels, allowing prescribed fires to maintain juniper savannas from becoming juniper woodlands.

Heavy historic grazing, especially around late 1800s and early 1900s left a lasting impression. Stocking rates have declined markedly since early 1900s with adoption of basic tenets of rangeland management. Livestock numbers declined with adjusted carrying capacity from noticeable shifts in vegetation composition. Secondary results include loss of soil fertility and water holding capacity (Asner and Archer 2010). Without livestock grazing, recovery would be mixed especially with changes in climatic carbon dioxide, temperatures and precipitation fluctuations, which affects soil and vegetation response.

Eliminating livestock use and many rangeland improvements could create a visually pleasing recreation experience for authorized off road users. Many fences and gates may be removed where they are not necessary and would eliminate needs to open and close gates.

Recreation use, especially desirability to camp, could increase with reduced conflict between recreational use and livestock. This causes new areas of disturbance that are unrelated to livestock use.

Removal of livestock would eliminate any potential damage to campsites and recreational areas along Salt River.

Alternative 2 Effects

Grazing annual forbs and grasses led to changes in composition of annual plant communities, documented in a two-year study on grazed versus ungrazed desert sites (Waser and Price 1981). Sites became dominated by a few annual species, while those considered relatively rare on the sites tended to drop out of grazed sites.

Rangeland management research indicates conservative or moderate livestock use may result in plant vigor and landscape similar to an absence of livestock grazing (Holechek et al. 1999, Navarro et al. 2002, Loeser et al. 2007). These studies do not specify whether soils and vegetation being influenced by livestock grazing pressure were in satisfactory condition or some form of impaired condition (i.e., compaction, limited diversity) when the studies began. Climatic carbon dioxide levels, temperature and precipitation are leading factors for rangeland species production (Izaurrealde et al. 2011). Stocking rates, timing and frequency must be assessed, due to bimodal, localized precipitation patterns and frequent regional drought events.

Limited water developments, terrain, time of year, and large pastures create uneven livestock distribution. Installation of new rangeland developments awaits NEPA analysis. Livestock trailing occurs, especially to and from water developments, salt and bedding areas. Heavier trailing occurs in areas where distribution is uneven.

Maintenance and installation of new water developments would utilize above ground pipelines, potentially increasing temperature of water in troughs. Above ground pipelines exposed to high temperatures and direct sunlight, when not charged with water, may speed breakdown of pipes. Some water developments provide water to wildlife. Livestock and wildlife species would continue to compete for palatable forage.

Grazing pressure would likely continue decreasing species like grama grasses and increase opportunistic species, such as curly mesquite and three-awn. Warm season perennial grasses such as curly mesquite and three-awns will become productive following not only summer monsoonal moisture, but spring moisture as well. Grama species should receive very light grazing pressure during periods of rapid growth, which typically follow summer monsoon rain events. Growth points are higher above ground and more susceptible to grazing pressures, which require more energy to regrow during this time. They can then be grazed more aggressively following seed set in the fall and winter months with little undesirable effect. Curly mesquite should be protected from use during key growth periods to facilitate seed set and stolon production, which can help stabilize loose soils (U.S. Forest Service 1988).

Livestock grazing contributes to the spread of noxious and invasive weeds. Red brome and filaree are opportunistic exotic species, early spring germinators that are spread through cattle grazing and attachment to coats. Temperature, precipitation, and elevation are primary drivers of germination. Red brome has a short window of grazing opportunity before seed heads form and attach to animals or blow in wind. Filaree is desired forage by livestock in early spring, after which it forms seed heads and burrows into animal coats or soil. Reduction of some noxious and invasive weeds through grazing would continue, reducing fine fuel fire hazards.

Terrain would continue to create uneven livestock distribution. Many portions of the project area have slopes greater than 40 percent and are typically not utilized by livestock, increasing pressure on slopes less than 40 percent.

Cumulative Effects

See also cumulative effects as described for alternative 2, semi-desert grasslands.

Lack of fire and mechanical treatments has contributed to increased juniper cover, converting many acres into juniper woodlands. Livestock grazing and drought created a loss of understory grasses, which reduced amounts of fine fuels, diminishing fire frequency and rapidly changing

this vegetation type (Tausch et al. 1981). Past and present droughts have also removed grass species. Once wet seasons return, rainfall promotes growth of juniper without competition from grasses. Soil erosion would likely continue while succession is in flux.

Cattle can act as a vector for transportation and seed dispersal of noxious weeds. Disturbance caused by cattle grazing would continue to increase likelihood of noxious weed establishment.

Alternative 3 Effects

See effects for alternative 3, semi-desert grasslands.

Proposed fencing would decrease pasture size, reducing uneven distribution in larger pastures and potential overutilization of riparian areas.

Grazing/ browsing above 40 percent utilization to reduce seed propagation of nonnative herbaceous plants and reduce density of woody plants: effects would be similar to those described under Sonoran Desert vegetation, alternative 3. This type of treatment would reduce the grass component which may limit fuel for wildfires, potentially promoting transition to a Juniper Woodland.

High intensity/ short duration grazing: effects would be similar to those described for grazing/ browsing above 40 percent utilization (above).

Fencing/ herding to improve livestock distribution: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Water development to improve livestock distribution: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Erosion control structures: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Seeding/ planting native vegetation in recovering soils: Species that may be planted include but are not limited to; alligator juniper, redberry juniper, sotol, skunkbush sumac, beargrass, hairy grama, curly mesquite, squirreltail (*Elymus elymoides*) and cane beardgrass (*Bothriochloa barbinodis*).

Salt and/or low moisture blocks to distribute livestock: effects would be similar to those described under Sonoran Desert vegetation, alternative 3.

Noxious weed and invasive plant removal/ reduction through mechanical, chemical, biological, and fire treatments: Species that may be removed include but are not limited to, tree of heaven (*Ailanthus altissima*) and Russian olive (*Elaeagnus angustifolia*).

Fuels reduction (prescribed fire and mechanical methods): Could be used to remove invading pinyon and juniper trees maintaining a healthy juniper savannah. When using mechanical methods, slash left behind can increase soil carbon ratios while decreasing the available soil nitrogen. This could inhibit vegetation growth and change the existing plant community.

Cumulative Effects

See cumulative effects as described for alternative 2 (above) and alternative 3, semi-desert grasslands.

Juniper fuel wood treatments would damage or remove desirable herbaceous and shrubby vegetation through mechanical disturbance. Recovery of desirable herbaceous and woody species would occur quickly as more natural resources become available. Historical juniper treatments provide additional forage for cattle grazing and future treatments would occur to maintain landscape conditions.

Current grazing removes fine fuels and reduces the ability for fire to limit establishment of junipers.

Alternative 4 Effects

Increased vigor and diversity of warm season forbs, grasses, subshrubs and shrubs is expected with winter and spring grazing. Grama species would receive no livestock grazing pressure during periods of rapid growth, which typically follow summer monsoon rain events. Curly mesquite should be protected from use during key growth periods to facilitate seed set and stolon production, which can help stabilize loose soils (U.S. Forest Service 1988). Winter grazing may increase browsing and foraging on some winter growing plant species. Grama species can be grazed more aggressively following seed set in the fall and winter months with little undesirable effect.

Cattle may also benefit from management prescriptions that optimize forage and production except where those prescriptions limit grazing to reduce livestock and wildlife competition for forage.

Terrain would continue to create uneven livestock distribution. Many portions of the project area have slopes greater than 40 percent and are typically not utilized by livestock, increasing pressure on slopes less than 40 percent. With decreased temperatures in winter and spring seasons, cattle may travel farther upslope than during hotter months.

New proposed water developments would still be dependent on water availability through wells and where water is not available, livestock distribution would be uneven. Maintenance and installation of new water developments have been utilizing above ground pipelines and potentially increasing temperature of water in troughs. Some water developments would continue to provide water to wildlife. New proposed fencing would decrease pastures size, helping to reduce uneven distribution of livestock in larger pastures.

Livestock trailing would continue to occur throughout allotments, especially to and from water developments, salt and bedding areas. Heavier trailing may continue in areas where distribution is uneven.

Proposed fencing of key reaches and other riparian areas as described in the riparian/ hydrology section of this analysis could increase livestock pressure on uplands, but overall decrease pressure to all riparian areas, strictly due to winter and spring grazing.

Livestock grazing may continue to spread noxious and invasive weeds. Many species grow during early spring and would be utilized strictly by livestock. A reduction of some noxious and invasive weeds through grazing would continue, reducing fine fuel fire hazards.

Cumulative Effects

See cumulative effects as described for alternative 3.

Recovery of desirable species would be expected to occur quickly in the absence of juniper cover, as more natural resources become available for herbaceous and woody species.

Proposed seasonal grazing and livestock removal along the Salt River and in key reaches would increase vegetation and soil productivity and recovery.

Livestock grazing in wilderness would continue in some areas, only during winter months. Improvements would continue to be maintained with proper authorization.

Vegetation Existing Condition and Effects Analysis- Juniper Woodland

Dominant vegetation: alligator juniper, redberry juniper, Emory oak (*Quercus emoryi*), sotol, skunkbush sumac, turbinella oak (*Quercus turbinella*), agave (*Agave spp*), manzanita (*Arctostaphylos spp.*), buckbrush (*Ceanothus spp.*), mountain mahogany (*Cercocarpus montanus*), holly leaf buckthorn (*Rhamnus crocea*), bull or mountain muhly (*Muhlenbergia spp.*)

Rangeland management tools that may be used: light to conservative grazing to maintain or improve diversity of native species and reduce nonnative annual grasses; grazing to reduce seed propagation of nonnative plants; mechanical, biological or chemical treatment to reduce or remove noxious weeds; chemical or timber/fuel wood treatment to achieve desired juniper density; fencing, water development, salt and or low moisture blocks to distribute livestock across landscape; seeding or planting native vegetation in recovering soils; use of managed or wildland fire to move vegetation towards desired conditions

Pastures containing juniper woodlands: Sedow- 4Y, Indian Gardens, Reveg, Storm Canyon, Bronson, New Corral, Hess, Brushy, Monument, Rock Springs, Walnut, Sevenmile, Home Horse, Hudson; **Hicks-Pikes Peak-** Horseshoe Bend, Lower Shute Springs, Windmill, North Steer, Lower Devore, Holly, Rip, Murphy, Kenny; **Chrysotile-** Ash Creek, Tony, Horse #1, #2, #3, North Ash Creek, Regal, 72, Timber, Home, Carol, Jackson, Survey, Poverty; **Haystack Butte-** Cottonwood, Steer, Bronson, Breeding; **Poison Springs-** Klondike; **Dagger-** Oak Creek Mesa.

Water developments: wells with windmills or pumps, spring boxes or horizontal wells on active springs, live water in creeks, seasonal water in drainage “potholes,” dirt stock tanks, storage tanks at wells and spring developments with associated pipelines and troughs

Presence of cool season perennial grasses increases in this vegetation type, especially where openings in woodland cover are common. Tree and shrub cover can be dense in this vegetation type and juniper encroachment into historic openings is common. Palatable species tend to be most diverse in areas where grazing pressure has been light or nonexistent. Livestock use tends to be concentrated in openings on flatter terrain, such as benches or saddles. Livestock impacts are most evident near available water.

Alternative 1 Effects: same as described for Juniper Savannahs, alternative 1

Lack of fire and mechanical treatments has increased juniper cover, converting many acres into juniper woodlands. Historic livestock use and drought have created a loss of understory grasses, which reduced amount of fine fuels, diminishing fire frequency and rapidly changing vegetation type (Tausch et al. 1981). Past and present droughts have also removed grass species and once wet seasons return, juniper growth is promoted without competition from grasses.

Alternative 2 Effects

Same as described for Juniper Savannahs, alternative 2

Alternative 3 Effects

Same as described for Juniper Savannahs, alternative 3

Juniper control treatments can impact soils by removing over story cover leaving soils, at least temporarily, more susceptible to erosion. However, juniper treatments that add slash cover can indirectly lead to an increase in herbaceous cover and a decrease in erosion potential. Fires used in juniper control projects can indirectly impact soils by, in some cases, allowing an increase in noxious plants. Historic juniper treatments have left areas of woodlands with an increased density of smaller trees. Without juniper treatments these areas are not likely to improve.

Seeding/ planting native vegetation in recovering soils: Species that may be planted include but are not limited to; alligator juniper, redberry juniper, Emory oak, sotol, skunkbush sumac, turbinella oak, agave, manzanita, buckbrush, mountain mahogany, holly leaf buckthorn, bull or mountain muhly.

Timber/ fuel wood sales for tree density management: Direct effects: removes trees; equipment used to remove trees crushes vegetation. Indirect effects: removal of vegetation through equipment used to remove wood products. Cumulative Effects: disturbance and compaction of soils in the removal of wood products increases chances of noxious weed infestations and reduces ability for native plant re-establishment. Fuel wood sales could be used to convert juniper woodlands to juniper savannahs under proper soil conditions and climatic conditions. When using mechanical methods, slash left behind can increase soil carbon ratios, while decreasing the available soil nitrogen. This could inhibit vegetation growth and possibly initial diversity.

Cumulative Effects

Cumulative effects are similar to those described for Juniper Savannah.

Alternative 4 Effects: Same as described for Juniper Savannahs, alternative 4

Vegetation Existing Condition and Effects Analysis- Turbinella Oak Chaparral

Dominant vegetation: turbinella oak, juniper, skunkbush sumac, agave, buckbrush, mountain mahogany, holly leaf buckthorn, manzanita

Rangeland management tools that may be used: light to conservative grazing to maintain or improve diversity of native species and reduce nonnative annual grasses; grazing to reduce seed propagation of nonnative plants; mechanical, biological, or chemical treatment to reduce or remove noxious weeds; chemical or timber/fuel wood treatment to achieve desired juniper density; fencing, water development, salt and or low moisture blocks to distribute livestock across landscape; seeding or planting native vegetation in recovering soils; use of managed or wildland fire to move vegetation towards desired conditions.

Pastures containing turbinella oak chaparral: Sedow- 4Y, Indian Gardens, Reveg, Storm canyon, Walnut, Bronson, Hess, Brushy, Monument, Rock Springs; **Hicks-Pikes Peak-** Hope, Rip, Kenny, Murphy, Horseshoe Bend, Windmill, South Steer, Lower devore, Holly, Hicks, West; **Chrysotile-** Survey, Carol, Ash Creek, Tony, North Ash Creek, Regal, Timber, Jackson, Poverty; **Haystack Butte-** Cottonwood, Upper River, Bronson, Breeding; **Poison Springs-** Upper Blevens, Blevens, Summit, Klondike; **Dagger-** Oak Creek Mesa, Upper Coon Creek, North Sheep.

Water developments: wells with windmills or pumps, spring boxes or horizontal wells on active springs, live water in creeks, seasonal water in drainage “potholes,” dirt stock tanks, storage tanks at wells and spring developments with associated pipelines and troughs.

Monitoring indicates that there are areas where vigor of key species is low and no recruitment of key species was observed. In general, biotic integrity has moderately departed from what is expected for this vegetation type. Chaparral tends to be dominated by manzanita and turbinella oak, with more palatable species occurring with limited frequency and in areas where livestock grazing pressure is reduced, such as steep slopes and limited available water. Perennial grasses occur only in limited amounts, often because soil properties do not support their recruitment.

Alternative 1 Effects: same as described for semi-desert grasslands

Areas with currently open canopies (shrub-free or dominated by herbaceous plants) due to livestock trailing or concentrated use could become denser. Browsing of palatable shrubs by deer and elk would continue.

Historic fires in this vegetation type increased shrub diversity and forage for livestock. Without grazing, these activities would not be necessary to change composition type. Prescribed fires could be used to remove dense pockets of chaparral to increase species diversity.

Alternative 2 Effects

See effects as described for alternative 2, Juniper savannahs. Presence of annual forbs and grasses and perennial grasses is limited in this vegetation type.

Disproportionate use of limited palatable shrubs and grasses over less palatable chaparral species can result in a less diverse vegetative composition. Use of areas dominated by chaparral depends on vegetative composition and access to palatable forage. Species which are palatable include sporadic perennial grasses and half-shrubs, mountain mahogany, buckbrush, and skunkbush sumac. These large shrubs are also desirable to wildlife browsers and often occur in limited quantities because they are selected for by all browsers over less palatable shrubs such as turbinella oak and manzanita.

Cumulative Effects

Lack of fire has increased shrub density and reduced an occasional browse species component in many areas. Continued management would limit cattle grazing opportunities in this shrub-dominated vegetation type.

Cumulative effects are similar to those described for Juniper Savannahs.

Alternative 3 Effects

Effects are similar to those described for alternative 3, Juniper Savannahs.

Seeding/ planting native vegetation in recovering soils: Species that may be planted include but are not limited to; turbinella oak, juniper, skunkbush sumac, agave, buckbrush, mountain mahogany, holly leaf buckthorn, and manzanita.

Noxious weed and invasive plant removal/ reduction through mechanical, chemical, biological, and fire treatments: effects would be similar to those described under Sonoran Desert vegetation, alternative 3. Species that may be removed include but are not limited to, tree of heaven and Russian olive.

Fuels reduction (prescribed fire and mechanical methods): Removal of some chaparral could increase plant diversity. When using mechanical methods, slash left behind can increase soil carbon ratios while decreasing the available soil nitrogen. This could inhibit vegetation growth and change the initial plant community.

Timber/fuel wood sales for tree density management: Direct effects: removes trees; equipment used to remove trees tramples vegetation. Indirect effects: removal of vegetation through equipment used to remove wood products. Cumulative Effects: disturbance and compaction of soils in the removal of wood products increases chances of noxious weed infestations and reduces ability for native plant re-establishment. Fuel wood sales could be used to reduce fuel loads that act as ladders to ponderosa pine and mixed conifer in a wildfire.

Cumulative Effects

Lack of fire has increased shrub density and reduced an occasional browse species component in many areas. Continued management would limit cattle grazing opportunities in this shrub dominated vegetation type.

Cumulative effects are similar to those described for Juniper Savannahs.

Alternative 4 Effects

See effects as described for alternative 4, Juniper Savannahs.

Even with seasonal grazing, disproportionate use of limited palatable shrubs and grasses over less palatable chaparral species can result in a less diverse vegetative composition. Use of areas dominated by chaparral depends on vegetative composition and access to palatable forage. Species which are palatable include sporadic perennial grasses and half-shrubs, mountain mahogany, buckbrush, and skunkbush sumac. These large shrubs are also desirable to wildlife browsers and often occur in limited quantities because they are selected for by all browsers over less palatable shrubs such as turbinella oak and manzanita.

Cumulative Effects: similar to those described in Juniper Woodlands

Vegetation Existing Condition and Effects Analysis- Ponderosa Pine and Mixed Conifer

Dominant vegetation: Ponderosa pine (*Pinus ponderosa*), Gambel oak (*Quercus gambelii*), Douglas fir (*Pseudotsuga menziesii*), buckbrush, mountain mahogany, bull or mountain muhly, Arizona fescue (*Festuca arizonica*), bluegrass (*Poa spp.*)

Rangeland management tools that may be used: light to conservative grazing to maintain or improve diversity of native species and reduce nonnative annual grasses; grazing to reduce seed propagation of nonnative plants; biological treatment to reduce or remove noxious weeds; mechanical, biological, chemical and or timber/fuel wood treatment to achieve desired tree density; fencing, water development, salt and or low moisture blocks to distribute livestock across landscape; use of managed or wildland fire to move vegetation towards desired conditions.

Pastures containing ponderosa pine/ mixed conifer: Chrysotile- Tony, Timber, Home, Carol, Horse #1, #2, #3; Haystack Butte- Bronson; Dagger- Oak Creek Mesa.

Water developments: wells with windmills or pumps, spring boxes or horizontal wells on active springs, live water in creeks, seasonal water in drainage “potholes,” dirt stock tanks, storage tanks at wells and spring developments with associated pipelines and troughs.

This vegetation type is tree-dominated with a shrub understory. Perennial grasses and other palatable forage are limited to small open meadows. These areas occur infrequently and not always in conjunction with available water, limiting livestock capacity. Because of lighter historic livestock grazing, many of these areas are generally meeting expectations for biotic integrity.

Alternative 1 Effects: similar to those described for Turbinella Oak Chaparral

Limited access and available palatable forage in ponderosa pine and mixed conifer forests on Dagger, Chrysotile and Haystack Butte allotments naturally limits impacts of livestock grazing on shrubs and grasses.

Careful management of grazing has been shown to promote establishment and growth of forest trees by controlling competitive vegetation in conifer plantations (Doescher et al. 1987).

Removal of livestock would decrease disturbance in Mexican spotted owl habitat.

Grazing can be used as a tool to maintain species richness in mixed conifer vegetation zones as shown by a study done in Britain by Humphrey, et al. (2000) which showed species richness was maintained in a grazed study plot whereas it decreased when grazing was removed.

Alternative 2 Effects

In Upper Oak Creek pasture on Dagger Allotment, the understory is largely shrub dominated, limiting palatable vegetation and access. Only in a burned area on Center Mountain is there a significant amount of palatable forage. This area contains abundant and diverse perennial grasses where the tree canopy was reduced by wildfire. Cattle are currently not grazing in this vegetation type due to resource limitations (water, access, Mexican spotted owl [MSO]) habitat guidelines, and sensitive plants).

On Globe Ranger District, cattle have access to and utilize preferred understory vegetation in MSO habitats. Grazing outside MSO habitat time frames occur occasionally.

Water developments would continue to provide water to wildlife in preferred wildlife areas. Livestock and wildlife may continue to compete over preferable forage.

Livestock utilization and trailing in ponderosa pine is currently present but occasional to light in use. On Dagger Allotment, the ponderosa pine vegetation type has not been grazed by the permittee's livestock to date, but is proposed to be grazed in the future.

Terrain would continue to create uneven livestock distribution. Many portions of project area have slopes greater than 40 percent and are typically not utilized by livestock, increasing pressure on slopes less than 40 percent.

Cumulative Effects

See cumulative effects as described for alternative 2, Juniper woodlands.

Recreational users and cattle grazing conflicts would continue.

Alternative 3 Effects

In Upper Oak Creek pasture on Dagger Allotment, livestock would concentrate in openings where palatable forage is available and water is nearby. All other effects would be similar to those described for alternative 2, above.

Cumulative Effects

Similar to those described for alternative 2, Juniper Woodlands.

Alternative 4 Effects

Opportunity for grazing would be eliminated from Oak Creek Mesa Pasture on Dagger Allotment except as described in mitigation measures for this alternative, but would continue on a seasonal basis on Chrysotile Allotment and Haystack Butte Allotment. Snowfall in this vegetation type can limit grazing capacity, reducing the timing and availability of these pastures to be used on a seasonal basis. Effects of grazing would be most pronounced in spring.

Cattle may benefit from management prescriptions that optimize forage and production except where those prescriptions limit grazing to reduce livestock and wildlife forage competition.

On Globe Ranger District, cattle would have access to and likely utilize preferred understory vegetation in MSO habitat. Grazing outside MSO habitat time frames would occur occasionally.

Cumulative Effects

Similar to those described for Juniper Woodlands

A possible increase in the number of wells that will be proposed to be drilled due to the removal of new developments on springs and seeps and no grazing in the river corridor.

Soils

Desired Condition

Tonto National Forest Plan

- Manage vegetation to achieve satisfactory or better watershed conditions.
- Emphasize improvement of soil productivity, air, and water quality.
- Management activities within the desert zone must fully recognize the limitations this unique ecosystem has to impacts of man's uses and activities.

Forest Service Manual Direction

- FSM 2550.1 – Authority 1, The Multiple use-Sustained Yield Act states that management of the National Forests must provide “sustained yields in perpetuity without impairment of the productivity of the land.”
- FSM 2550.3 – Policy “Manage forest and rangelands in a manner that will improve soil productivity.”
- FSM 2521.03 - Objective “Manage terrestrial ecosystems and NFS watersheds to protect soil productivity and hydrologic function. Implement soil and water conservation measures with management activities to maintain satisfactory or optimum watershed conditions.”

Desired condition is to eventually have all soils in satisfactory condition. Soils in arid and semi-arid environments normally recover slowly from disturbance; therefore it may not be practical to expect all soils to reach satisfactory condition within a short period of time but all soils should, at a minimum, be improving. Satisfactory soils have properties that allow good infiltration of water. Properties such as granular surface soil structure, soft consistence, low bulk density, and large pores to allow rapid and deep entry of water. If soils that are not satisfactory do not have these

properties they should at least be showing signs of improvement such as softer and looser surface horizon. Satisfactory soils should be stable and able to resist erosion. There should be no conspicuous rills and gullies and no other signs of accelerated erosion such as pedestalled plants and rocks or exposed roots. In addition there should be no soil deposited on the uphill sides of logs, rocks, or larger plants.

If soils do have erosion problems, there should be signs that they are stabilizing. Positive signs are gullies starting to heal over and plants re-colonizing eroded areas. Healthy soils also have appropriate amounts of litter or plant cover to help rebuild or maintain soil organic matter and maintain nutrient levels. Grasslands and ecosystems with grassy understories should have well distributed grasses at an appropriate density for the climate. Grass roots not only resist erosion, but help supply organic matter and nutrients to the soil. Ecosystems such as chaparral and conifer forests rely on needle cast and leaf litter to protect soil from erosion and add organic matter to the soil surface horizons. These ecosystems should have well distributed litter that are not only associated with prominent plants. Conifer forests should also have 5 to 14 tons of coarse woody material that help retain moisture and nutrients. Sonoran Desert soils should have a cover of cryptogamic soil crusts to reduce soil erosion, increase infiltration, and limit the spread of exotic annuals.

General desired conditions for soils are to:

- Maintain or improve soils currently in **satisfactory condition** (appendix A, map 9).
- Improve soils in **impaired soil condition**, so they are reaching or moving towards **satisfactory condition**.
- Improve soils in **unsatisfactory soil condition**, so they are reaching or moving toward at least **impaired condition**.

Soils Existing Condition and Effects Analysis- Sonoran Desert

Desert soils are dominated by Torrifluvents (recent alluvium) along major drainages; poorly developed Torriorthents on steep slopes; well-developed Haplargids on non-calcareous flats and hills; and Calciargids and Haplocalcids on calcareous hills and flats. Calcareous soils are normally associated with creosote bush. Sonoran Desert soils were rated as follows: Satisfactory-22,691 acres; Impaired-15,386 acres; Unsatisfactory-12,716 acres; Unstable-11,773 acres.

In 2010, a national effort was launched to assess the condition of all 6th code watersheds on Forest Service land. Twelve attributes were assessed. Attributes that may be affected by this project are: Water Quality, Water Quantity Condition, Aquatic Habitat Condition, Aquatic Biota Condition, Riparian/Wetland Vegetation Condition, Soil Condition, Fire Effects and Regime, Forest Cover, Rangeland, and Terrestrial Invasive Species. The results of the assessment for the 6th code watersheds in the project area are listed in appendix F.

General Effects of Grazing

Direct Effects: Livestock grazing can affect soil quality in several ways. Hoof action of cattle can directly impact soils by compacting soils. The risk for compaction is greatest when soils are wet (NRCS 1996). Compaction decreases water infiltration, restricts rooting depth, and increases the hazard of water erosion (NRCS 1996, 1998 and 2001). Trailing by cattle on steeper slopes can physically displace soils, leading to erosion. Trampling by cattle in certain circumstances can temporally increase water infiltration rates, but tend to decrease long-term rates (Roundy et al. 1992). Cattle tend to concentrate on flatter areas especially if they are fairly open. Holechek

reports that cattle tend to use 10 to 30 percent slopes thirty percent less often than 0 to 10 percent slopes and 30 to 60 percent slopes sixty percent less often than flats. Slopes over 60 percent are seldom used (Holechek and Pieper 1992). Because of a tendency for cattle to use flatter slopes, areas of impacted soils are more likely to be found on gentler slopes. Range improvements (e.g., fencing, water developments, etc.) can have slight, localized, short-term impacts to soils during construction. Building new fences and developing waters, as mentioned in the proposed action, would have extremely small, localized direct impacts to soils. Biological crusts play an important role in some ecosystems especially Sonoran deserts and, to a somewhat lesser extent, the other ecosystems in the analysis area. Crusts bind and protect soil from both water and wind erosion.

Indirect Effects: Cattle indirectly impact soils by removing vegetation resulting in a loss of protective cover including litter. Loss of vegetation and litter reduces infiltration and exposes soils to raindrop impact and overland flow thus leading to soil crusting and increased erosion. Reduced cover can also result in a loss of soil organic matter and a reduction in soil microbes, which play a significant role in nutrient cycling. Soils that are lower in organic matter have poorer structure which can also affect infiltration and root growth.

Building fences and developing waters may indirectly affect soils by improving distribution of cattle resulting in a net positive effect. Other management actions, such as salting and water development that affect livestock use patterns can improve cattle distributions and lessen impacts to heavily-used areas but could lead to increased use of other areas that had been previously unused or lightly used.

Cumulative Effects: Cumulative effects include the direct and indirect effects of the proposed action and alternatives when added to all past, present, and reasonably foreseeable future actions. Activities include:

- Past grazing actions have resulted in soil erosion and compaction while current management has, in some cases, prevented or slowed recovery.
- A long history of fire suppression has altered the characteristics of many ecosystems.
- Mining: There are scattered, unworked mining claims that could become active in the future. There is active uranium exploration taking place. There are scattered old, inactive mines within the analysis area including one CERCLA (Comprehensive Environmental Response Compensation Liability Act) site (Phillips Mine covering 362 acres). The mines are currently closed. Mining activity has had only small, localized impacts to vegetation, but runoff from mine areas has led to increased soil erosion
- Recent major fires within the analysis area include the 2000 Coon Creek Fire and 2010 Zimmerman Fire.
- The Seven Prescribed Burn covers portions of Sedow Allotment. Miscellaneous smaller burns have also occurred.
- Thinning for fuels reduction (Carroll Mountain communications).
- Recent juniper thinning projects including the on-going Timber Camp Woodland Restoration Project. Past juniper treatments, mostly on the Chrysotile Allotment, include juniper chaining and pushes conducted in the past 40 to 60 years.
- Unauthorized cross country travel can cause undesirable effects to soils and vegetation through direct impacts on soils and removal or degradation of herbaceous or woody vegetation. The Travel Management Rule (TMR) is intended to analyze alternate motorized routes in order to provide access and a recreation experience sufficient, so vehicle operators no longer feel compelled to travel off established roads or trails.

Enforcement of TMR is imperative to ensure compliance. Improperly maintained roads can cause soil erosion where runoff from roads is allowed to concentrate. Road maintenance that includes Best Management Practices should reduce sedimentation into streams and be beneficial to the watershed. Roads can be a source of concentrated runoff which can lead to localized soil erosion down slope from roads. Road maintenance that includes BMPs should reduce erosion and benefit the watershed.

- There is a 500 KV power line running for 22 miles through Poison Springs and Dagger Allotments. A 200 foot right-of-way is maintained by trimming vegetation. This covers about 530 acres.
- Trespass cattle from adjacent non-Forest Service lands.
- There are three public sand and gravel sites.
- Introduction of non-native invasive plants has led to an increased risk of erosion and wildfire.
- Recent and ongoing drought and possible future climate change can also impact conditions.
- Some actions such as small mines, gravel pits, and travel management could however affect small, localized areas. Other activities would be slightly more extensive. Periodic vegetation maintenance, trimming plants to maintain a safe distance beneath a 500 KV power line would affect about 530 acres but would have only minor effects on soils since plants are not removed. CERCLA cleanup of the Phillips mine covering 362 acres is likely to produce long-term benefits to soil and vegetation. Some past actions, however, combined with the lack of possible treatments listed in the proposed action could affect much more extensive areas.
- Long-term fire suppression has left certain ecosystems at an increased risk of a large wildfire. Lack of fire would have little short-term effects to soils and vegetation, but could cause a long-term increase in the risk of wildfire leading to undesirable effects on soils.
- Juniper treatments, mostly on the Chrysotile Allotment in the 1950s and 1960s, have left areas of woodlands with increased density of smaller trees. Without treatments these areas are unlikely to improve. Climate change presents additional considerations. Warming and drying of the climate could increase the risk of wildfire especially in fire-dependent ecosystems.

Environmental Consequences – Alternative 1 (No Action)

This alternative is most likely to increase the cover of biological crusts and their benefits to soils. Effects of removing improvements (mostly fences) would be minor, localized, short-term disturbance to soils.

Removing grazing would allow impaired and unsatisfactory soils, often affected by compaction, to recover. Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, would be generally beneficial to soils and vegetation.

Environmental Consequences – Alternative 2 (Current Management)

Direct and Indirect Effects: Under this alternative, about seventeen percent of impaired and unsatisfactory soils would not be grazed. Soils most likely to be in impaired or unsatisfactory condition occur on flatter areas, areas most likely to be used by livestock. These areas are likely to continue to receive a substantial amount of use however; however, if allowable use guidelines

are not exceeded in these areas they should begin to improve. Overall improvement, except in areas not scheduled to be grazed, is not likely to be as fast as would occur under alternative 1. Unstable soils occur on nearly 18,000 acres within the analysis area. However, under this alternative, almost half of the unstable soils occur in pastures that would not be grazed. Most of the rest occur on steep slopes and would be expected to receive no to light livestock use only. Therefore, under this alternative, unstable soils would be minimally impacted. Grazing can have detrimental effects on the amount of biological crusts (Beymer and Klopatic 1992). Biological crusts on sandy soils are less susceptible to disturbance when moist or wet; on clay soils, when crusts are dry. In general, light to moderate stocking in early- to mid-wet season is recommended (USDI 2001). Under this alternative, about 55 percent of Sonoran Desert acres would be grazed. This would allow un-grazed acres to improve their cover of biological crusts. Grazing may slow or prevent recovery of biological crusts in other areas.

Cumulative Effects: direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed under alternative 1, are likely to result in attainment of desired conditions for soils and vegetation but at a slower rate than for alternative 1. Less than satisfactory soils that are not grazed would improve the fastest, but controlling grazing and limiting utilization to a maximum of 40 percent herbaceous and 50 percent woody would allow impaired and unsatisfactory soils, often affected by compaction, to begin to recover. However, recovery from the effects of grazing is likely to be slower than under alternative 1. Other cumulative effects as described above would continue to affect soils in the analysis area.

Environmental Consequences – Alternative 3 (Proposed Action)

Direct and Indirect Effects: success of meeting short and long-term desired conditions would depend on timely monitoring and cattle management. About thirty percent of the analysis area contains soils in less than satisfactory condition, nearly all on slopes less than forty percent. Forage production on these areas is normally low. These soils occur extensively in all ecosystems except conifer forests. Use of adaptive management techniques should, over time, allow these areas to improve but it may take decades for some areas with impaired and unsatisfactory soil condition to improve to a better condition class. If guidelines are not met, these areas may not improve. Overall improvement is likely to be slower than under alternative 1 and in some areas slower than alternative 2 since about 20,000 acres of impaired and unsatisfactory soils would not be grazed under alternative 2.

If utilization guidelines are met, soils in satisfactory condition are likely to remain so. Most of these soils occur on slopes greater than forty percent and are not likely to be heavily impacted by cattle. However, about 7,000 acres, mostly within Sonoran Desert ecosystems on Poison Springs Allotment, do occur on slopes of less than forty percent and are likely to be affected by cattle grazing. These soils are highly erosive and may be damaged by hoof action or if grazing reduces vegetative cover.

This alternative is most likely to impede growth or decrease cover of biological crusts and their ecological benefits. Since about 60,000 acres of Sonoran Desert are grazed under this alternative compared to about 27,000 under alternative 2, this alternative would have a significantly greater undesirable effect on biological crust development than alternative 2.

Developing new or improved water sources would have an overall positive indirect effect by improving cattle distribution but could create undesirable effects in some areas by drawing cattle

into places that previously received no or only light use. Developing water would have very minor direct effects on soils.

Cumulative Effects: direct and indirect effects of grazing management when combined with other past, present or reasonably foreseeable actions should result in most areas moving toward desired conditions although at a slower rate than under alternative 1. Some impaired and unsatisfactory soils may improve at a slower rate than with no grazing. In general, under alternative 3, effects on soils and vegetation from grazing are somewhat less positive than alternative 2 and much less positive than alternative 1.

Environmental Consequences – Alternative 4 (Habitat Optimization)

Direct and Indirect Effects: general effects of grazing would be as described under alternative 3, except about 5,600 fewer acres of Sonoran Desert vegetation would be grazed and grazing would be changed from yearlong to seasonal.

Cumulative Effects: direct and indirect effects of grazing management when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), would be very similar to alternative 3 except for acres excluded from grazing.

Effects of vegetation management tools: Effects of light to conservative grazing (up to 40 percent utilization) is analyzed above. *Grazing/ browsing in excess of this level* to reduce seed propagation of non-native herbaceous plants or to reduce density of woody plants may provide some reduction in species such as red brome and reduce risk of wildfire spread. Long term effects to soils may be a reduction in fire danger which could have an overall positive effect on soils and infiltration rates. *High intensity, short duration grazing* may increase planting of grass seeds but may reduce infiltration rates. Sediment yields have been shown to increase. This tool may be less successful in Sonoran Desert vegetation because drier climatic conditions may not favor recruitment or growth of new vegetation.

Fencing, salting, and herding of livestock and development of new water sources may have an overall beneficial indirect effect by improving cattle distribution, but may draw livestock into areas that previously received light or no grazing pressure. New fences, salting, and new water developments would have a minor indirect effect on soils.

Effects of erosion control structures are difficult to discuss without site-specific plans. Short-term localized disturbance to soils can be anticipated. If structures are designed and installed correctly in suitable locations, net long-term effects should be beneficial.

Effects of seeding or planting native vegetation in recovering soils are also difficult to display without site-specific information. Large seeding projects could result in short-term increases in soil erosion. Standard practices such as disking along contours may reduce erosion risks and overall long-term effects should be beneficial.

Treatment of noxious weeds may have short-term, minor, localized undesirable effects on soils however long-term effects would be positive.

Soils Existing Condition and Effects Analysis- Semi-desert Grassland

Soils are varied but generally well developed, fine textured Aridic Haplustalfs dominate ranging from medium to fine textured. Semi-desert grassland soils were rated as follows: satisfactory-31,925 acres; Impaired-14,903 acres; Unsatisfactory-7,326 acres; Unstable-3,130 acres.

Environmental Consequences – Alternative 1 (No Action)

Effects are as described under alternative 1, Sonoran Desert vegetation type.

Environmental Consequences – Alternative 2 (Current Management)

Effects are as described under alternative 2, Sonoran Desert vegetation type unless specific to that vegetation type. Biological soil crusts occur in semi-desert grasslands.

Environmental Consequences – Alternative 3 (Proposed Action)

Effects are as described under alternative 3, Sonoran Desert Vegetation type unless specific to that vegetation type. Biological soil crusts occur in semi-desert grasslands.

Environmental Consequences – Alternative 4 (Habitat Optimization)

Direct and Indirect Effects: general effects of grazing would be as described under alternative 3, except about 3,000 fewer acres of semi-desert grassland vegetation would be grazed and grazing would be changed from yearlong to seasonal.

Cumulative Effects: direct and indirect effects of grazing management when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), would be very similar to alternative 3 except for acres excluded from grazing.

Effects of vegetation management tools: For grazing above conservative utilization rates to reduce non-native or unwanted vegetation, areas with red brome populations would see similar effects to those described under Sonoran Desert vegetation. Browsing of shrubs that is heavy enough to reduce density of unwanted woody plants may very likely have an undesirable impact to cover of desirable woody species as well as herbaceous vegetation. *High intensity, short duration grazing* may increase planting of grass seeds and emergence of seedlings but may reduce water infiltration rates. Sediment yields have been shown to increase. If mulch is incorporated into soils during this treatment, infiltration rates may remain high and sedimentation rates low. Effects to soils may be either beneficial or undesirable depending on extent of treatment.

Effects of fencing, herding, new water development, salting or using low-moisture feed blocks to distribute livestock are similar to those described under Sonoran Desert vegetation.

Effects of installing erosion control structures are similar to those described under Sonoran Desert vegetation.

Effects of seeding or planting native vegetation would be similar to those described under Sonoran Desert vegetation.

Effects of noxious weed control would be similar to those described under Sonoran Desert vegetation.

Fuels reduction through prescribed fire may be beneficial or undesirable for soil conditions depending on type and health of ecosystems, baseline conditions, and type of burn planned. Where grass cover is low to begin, prescribed fires are not likely to lead to an increase in grass cover, but may increase bare soil or noxious weed presence. Where grasses are more abundant, prescribed burning may stimulate grasses and reduce density of encroaching woody plants, benefitting soils. Burning may initially suppress grass production but increase production in subsequent years.

Soils Existing Condition and Effects Analysis – Juniper Savannah

In juniper savannahs, fine textured Typic and Vertic Argiustolls are dominant. Juniper savannah soils were rated as follows: satisfactory-18,501 acres; Impaired-14,986 acres; Unsatisfactory-6,297 acres; Unstable-1,682 acres.

Environmental Consequences – Alternative 1 (No Action)

Effects are as described under alternative 1, Sonoran Desert Vegetation type unless specific to that vegetation type. Biological soil crusts occur in juniper savannahs. Juniper control treatments can indirectly impact soils by removing overstory cover thus leaving soils, at least temporarily, more susceptible to erosion; however, juniper treatments that add slash cover can indirectly lead to an increase in herbaceous cover and a decrease in erosion potential. Fires used in juniper control projects can indirectly impact soils by, in some cases, allowing an increase in noxious plants.

Environmental Consequences – Alternative 2 (Current Management)

Effects are as described under alternative 2, Sonoran Desert Vegetation type unless specific to that vegetation type. Biological soil crusts occur in juniper savannahs. Juniper control treatments can indirectly impact soils by removing overstory cover thus leaving soils, at least temporarily, more susceptible to erosion; however, juniper treatments that add slash cover can indirectly lead to an increase in herbaceous cover and a decrease in erosion potential. Fires used in juniper control projects can indirectly impact soils by, in some cases, allowing an increase in noxious plants.

Environmental Consequences – Alternative 3 (Proposed Action)

Effects are as described under alternative 3, Sonoran Desert Vegetation type unless specific to that vegetation type. Biological soil crusts occur in juniper savannahs. Juniper control treatments can indirectly impact soils by removing overstory cover thus leaving soils, at least temporarily, more susceptible to erosion, however, juniper treatments that add slash cover can indirectly lead to an increase in herbaceous cover and a decrease in erosion potential. Fires used in juniper control projects can indirectly impact soils by, in some cases, allowing an increase in noxious plants.

Environmental Consequences – Alternative 4 (Habitat Optimization)

Direct and Indirect Effects: general effects of grazing would be as described under alternative 3, except about 1,500 fewer acres of juniper savannah vegetation would be grazed and grazing would be changed from yearlong to seasonal.

Cumulative Effects: direct and indirect effects of grazing management when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), would be very similar to alternative 3 except for acres excluded from grazing.

Effects of vegetation management tools: For grazing above conservative utilization rates to reduce non-native or unwanted vegetation, areas with red brome or unwanted woody plants would see similar effects to those described under semi-desert grassland vegetation. *High intensity, short duration grazing* would see effects similar to those described under semi-desert grassland vegetation.

Effects of fencing, herding, new water development, salting or using low-moisture feed blocks to distribute livestock are similar to those described under Sonoran Desert vegetation.

Effects of seeding or planting would be similar to those described under Sonoran Desert vegetation.

Effects of installing erosion control structures are similar to those described under Sonoran Desert vegetation.

Effects of noxious weed control would be similar to those described under Sonoran Desert vegetation.

Timber or fuel wood sales for tree density management generally improve herbaceous ground cover and increase soil moisture. Commercial fuel wood sales, which provide for lop and scatter of slash, have generally been successful in increasing ground cover and reducing erosion. Treated areas may need maintenance such as burning or herbicide application.

Fuels reduction through prescribed fire may be beneficial or undesirable for soil conditions depending on type and health of ecosystems, baseline conditions, and type of burn planned. Where grass cover is low to begin, prescribed fires are not likely to lead to an increase in grass cover but may increase bare soil, juniper seedlings, or noxious weed presence. Where grasses are more abundant, prescribed burning may stimulate grasses and reduce density of juniper seedlings, benefitting soils. Maintenance burns which wait 3 to 5 years allow herbaceous cover to become re-established.

If burning accompanies mechanical treatment, protective slash cover may be reduced or removed, and soils may be sterilized under slash piles during extreme burning conditions. Traditional mechanical treatments such as pushing or chaining juniper initially reduce juniper density and normally require periodic maintenance to control seedlings and re-sprout. Soil disturbance is locally extensive. Historically, chaining projects have led to large increases in juniper density. Hydraulic shears may be effective in controlling juniper. Soil disturbance is normally minor if equipment is used when soils are dry. Effects to soils from mechanical mastication have not been fully studied.

Soils Existing Condition and Effects Analysis- Juniper Woodland

In woodlands, a mixture of fine textured Typic Argisutolls and Typic Haplustalfs is dominant. Soil conditions for woodlands are rated as follows: Satisfactory-21,138 acres; Impaired-8,562 acres; Unsatisfactory-5,539 acres; Unstable-2,158 acres.

Environmental Consequences – Alternative 1 (No Action)

Effects are as described under alternative 1, Sonoran Desert Vegetation type unless specific to that vegetation type. Biological soil crusts occur in juniper woodlands. Juniper control treatments can indirectly impact soils by removing overstory cover thus leaving soils, at least temporarily, more susceptible to erosion; however, juniper treatments that add slash cover can indirectly lead to an increase in herbaceous cover and a decrease in erosion potential. Fires used in juniper control projects can indirectly impact soils by, in some cases, allowing an increase in noxious plants. Historic juniper treatments have left areas of woodlands with an increased density of smaller trees. Without juniper treatments these areas are not likely to improve.

Environmental Consequences – Alternative 2 (Current Management)

Effects are as described under alternative 2, Sonoran Desert Vegetation type unless specific to that vegetation type. Biological soil crusts occur in juniper woodlands. Juniper control treatments

can indirectly impact soils by removing overstory cover thus leaving soils, at least temporarily, more susceptible to erosion; however, juniper treatments that add slash cover can indirectly lead to an increase in herbaceous cover and a decrease in erosion potential. Fires used in juniper control projects can indirectly impact soils by, in some cases, allowing an increase in noxious plants. Historic juniper treatments have left areas of woodlands with an increased density of smaller trees. Without juniper treatments these areas are not likely to improve.

Environmental Consequences – Alternative 3 (Proposed Action)

Effects are as described under alternative 3, Sonoran Desert Vegetation type unless specific to that vegetation type. Biological soil crusts occur in juniper savannahs. Juniper control treatments can indirectly impact soils by removing overstory cover thus leaving soils, at least temporarily, more susceptible to erosion; however, juniper treatments that add slash cover can indirectly lead to an increase in herbaceous cover and a decrease in erosion potential. Fires used in juniper control projects can indirectly impact soils by, in some cases, allowing an increase in noxious plants. Historic juniper treatments have left areas of woodlands with an increased density of smaller trees. Without juniper treatments soils in these areas are not likely to improve.

Environmental Consequences – Alternative 4 (Habitat Optimization)

Direct and Indirect Effects: The general effects of grazing would be as described under alternative 3, except about 1,000 fewer acres of juniper woodland vegetation would be grazed and grazing would be changed from yearlong to seasonal.

Cumulative Effects: The direct and indirect effects of grazing management when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), would be very similar to alternative 3 except for the acres excluded from grazing.

Effects of vegetation management tools: For grazing above conservative utilization rates to reduce non-native or unwanted vegetation, areas with unwanted woody plants would see similar effects to those described under semi-desert grassland vegetation. Heavy browsing may be useful in producing fire breaks to protect developed areas. Follow-up maintenance is required. *High intensity, short duration grazing* would see effects similar to those described under juniper savannah vegetation and may also be useful in producing fire breaks. This treatment may be less successful in areas with dense tree overstories.

Effects of fencing, herding, new water development, salting or using low-moisture feed blocks to distribute livestock are similar to those described under Sonoran Desert vegetation.

Effects of seeding or planting would be similar to those described under Sonoran Desert vegetation.

Effects of installing erosion control structures are similar to those described under Sonoran Desert vegetation.

Effects of noxious weed control would be similar to those described under Sonoran Desert vegetation.

Effects of timber or fuel wood sales for tree density management would be similar to those described under juniper savannah vegetation.

Fuels reduction through prescribed fire may be beneficial or undesirable for soil conditions depending on type and health of ecosystems, baseline conditions, and type of burn planned. In woodland areas with sufficient grass to carry fire, soils may benefit from reduced oak, pinyon, and juniper seedlings and increased grass cover. Woodland types with sparse understory could see increased bare soil and possible increase in annual plants or noxious weeds.

Effects to soils from mechanical treatments would be similar to those described under juniper savannah vegetation.

Soils Existing Condition and Effects Analysis – Turbinella Oak Chaparral

Well developed, medium and fine textured Typic Haplustalfs dominate but shallow poorly developed soils also occur. Soil condition ratings are as follows: Satisfactory-29,825 acres; Impaired-11,337 acres; Unsatisfactory-18,167 acres; Unstable-808 acres.

Environmental Consequences – Alternative 1 (No Action)

Effects are as described under alternative 1, Sonoran Desert Vegetation type unless specific to that vegetation type.

Environmental Consequences – Alternative 2 (Current Management)

Effects are as described under alternative 2, Sonoran Desert Vegetation type unless specific to that vegetation type.

Environmental Consequences – Alternative 3 (Proposed Action)

Effects are as described under alternative 3, Sonoran Desert Vegetation type unless specific to that vegetation type.

Environmental Consequences – Alternative 4 (Habitat Optimization)

Direct and Indirect Effects: general effects of grazing would be as described under alternative 3, except about 10,000 fewer acres of juniper woodland vegetation would be grazed and grazing would be changed from yearlong to seasonal.

Cumulative Effects: direct and indirect effects of grazing management when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), would be very similar to alternative 3 except for acres excluded from grazing.

Effects of vegetation management tools: For grazing above conservative utilization rates to reduce non-native or unwanted vegetation, areas with unwanted woody plants would see similar effects to those described under semi-desert grassland vegetation. Heavy browsing may be useful in producing fire breaks to protect developed areas. Follow-up maintenance is required. *Effects of high intensity, short duration grazing* may be beneficial if the tool was used once and the area allowed to rest. Grazing that is intensive enough to reduce brush cover is likely to lead to a decrease in water infiltration and increase in sediment yield.

Effects of fencing, herding, new water development, salting or using low-moisture feed blocks to distribute livestock are similar to those described under Sonoran Desert vegetation.

Effects of seeding or planting would be similar to those described under Sonoran Desert vegetation.

Effects of installing erosion control structures are similar to those described under Sonoran Desert vegetation.

Effects of noxious weed control would be similar to those described under Sonoran Desert vegetation.

Fuels reduction through prescribed fire may be beneficial or undesirable for soil conditions depending on type and health of ecosystems, baseline conditions, and type of burn planned. Large patches of burned vegetation may see large amounts of soil loss.

Effects to soils from mechanical treatments would be similar to those described under juniper savannah vegetation.

Soils Existing Condition and Effects Analysis- Ponderosa Pine and Mixed Conifer

Argiustolls are most common soils in ponderosa pine. Although soils vary with elevation and parent material, dominant soils are moderately deep to deep and fine textured. Soils under mixed conifer vegetation are generally medium textured Argiudolls. Soil conditions for coniferous forests are as follows: Satisfactory-7,767 acres; Impaired-652 acres.

Environmental Consequences – Alternative 1 (No Action)

Effects are as described under alternative 1, Sonoran Desert Vegetation type unless specific to that vegetation type.

Environmental Consequences – Alternative 2 (Current Management)

Effects are as described under alternative 2, Sonoran Desert Vegetation type unless specific to that vegetation type. The success of meeting short and long-term desired conditions would depend on timely monitoring and cattle management. About thirty percent of the analysis area contains soils that are in less than satisfactory condition. Forage production on these areas is normally low. Nearly all of these occur on slopes of less than forty percent. These soils occur extensively in all ecosystems except conifer forests.

Environmental Consequences – Alternative 3 (Proposed Action)

Effects are as described under alternative 3, Sonoran Desert Vegetation type unless specific to that vegetation type. This alternative grazes about 8,400 acres of conifer forests compared to about 2,500 acres in alternative 2 and no acres in alternative 1. Since soils in the conifer forests are nearly all satisfactory, this alternative would likely not affect recovery of soils in less than satisfactory condition.

Environmental Consequences – Alternative 4 (Habitat Optimization)

Direct and Indirect Effects: general effects of grazing would be as described under alternative 3, except about 6,000 fewer acres of juniper woodland vegetation would be grazed and grazing would be changed from yearlong to seasonal.

Cumulative Effects: direct and indirect effects of grazing management when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), would be very similar to alternative 3 except for the acres excluded from grazing.

Effects of vegetation management tools: For grazing above conservative utilization rates to reduce non-native or unwanted vegetation, areas with unwanted woody plants would see similar effects to those described under juniper woodlands. *Effects of high intensity, short duration grazing* would be similar to those described under juniper woodlands vegetation.

Effects of fencing, herding, new water development, salting or using low-moisture feed blocks to distribute livestock are similar to those described under Sonoran Desert vegetation.

Effects of seeding or planting would be similar to those described under Sonoran Desert vegetation.

Effects of installing erosion control structures are similar to those described under Sonoran Desert vegetation. Effects of noxious weed control would be similar to those described under Sonoran Desert vegetation.

Effects of timber and fuel wood sales for tree density management would likely decrease risk of large wildfires and their effects to soils.

Effects from fuels reduction through prescribed fire would be similar to those described under juniper woodlands. In conifer forests, low to moderate severity burns would reduce potential for large wildfires and subsequent effects to soils. There may be a short-term increase in erosion because of a reduction in litter cover. Erosion rates should return to normal within one to two years. Burning piles may sterilize soil, remove organic matter, and destroy soil structure. Following recommended mitigation measures can reduce effects of pile burning.

Effects to soils from mechanical treatments would be similar to those described under juniper savannah vegetation. Skidding and piling trees with bulldozers may cause soil compaction, rutting, or soil displacement. This treatment is most likely to occur during timber sales. Following BMPs such as season of use can minimize impacts.

Soils Existing Condition and Effects Analysis – Riparian

Soils within riparian zones are normally young, poorly developed Fluvents, mostly coarse textured with large amounts of coarse fragments however riparian zone soils are also highly variable. Riparian soils were rated as follows: Satisfactory-1,778 acres; Impaired-1,099 acres; Unsatisfactory-3,886 acres; Unstable-83 acres.

Environmental Consequences – Alternative 1 (No Action)

Effects are as described under alternative 1, Sonoran Desert vegetation type. Not grazing riparian vegetation would help minimize indirect effects to soils although use by wildlife and unauthorized livestock would still occur.

Environmental Consequences – Alternative 2 (Current Management)

Effects are as described under alternative 2, Sonoran Desert vegetation type unless specific to that vegetation type.

Environmental Consequences – Alternative 3 (Proposed Action)

Effects are as described under alternative 3, Sonoran Desert Vegetation type unless specific to that vegetation type.

Environmental Consequences – Alternative 4 (Habitat Optimization)

Direct and Indirect Effects: if cattle are excluded from grazing riparian areas, effects would be the same as those described under alternative 1. If cattle are allowed to graze, general effects would be similar to alternative 3 except that about 1,800 fewer acres of riparian vegetation would be grazed and grazing would be changed from yearlong to seasonal. Cooler season grazing normally leads to better distribution of cattle. Cattle spend less time in draws and lowlands and more time on ridge tops (Senft et al. 1985). This would allow more of the traditionally heavily

used areas, areas that tend to have more impaired and unsatisfactory soils, to recover. Cool season grazing may also benefit warm season grasses. An undesirable aspect is that soils are normally wetter in cool seasons and are more subject to compaction. Although cool seasons grazing leads to better cattle distribution, grazing intensity is much more critical than grazing timing in affecting perennial grass cover (Galt 1999). Effects of other management tools including grazing management tools would be nearly the same as under alternative 3.

Cumulative Effects: direct and indirect effects of grazing management when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), would be very similar to alternative 3 except for acres excluded from grazing.

Effects of vegetation management tools: Grazing and browsing above conservative use guidelines in riparian areas may lead to excessive trampling and trailing, which can destabilize stream banks, exposing soils and increasing erosion potential. *High intensity, short duration grazing* has similar effects. Removal of vegetation would lower a stream channel's resistance to erosion, causing accelerated soil erosion and increased sedimentation. Degree of these effects would be dependent upon treatment area size; small areas may have little impact while larger areas may produce large increases in erosion.

Fencing and herding to improve livestock distribution may reduce impacts to riparian soils. Moving water away from riparian areas may draw livestock away however incidental impacts to soils could still occur without fencing.

Effectiveness of erosion control structures depends on channel features. Improper installation or failure of check dams could lead to cutting, increased aggradation, and accelerated bank erosion. Successful installation of erosion control structures may reduce erosion and facilitate riparian vegetation growth.

Planting native herbaceous vegetation should facilitate rebuilding of stream banks by trapping sediment. Planting native woody vegetation would have lesser success, since woody species play a lesser role in trapping sediments. Once roots are large; however, they help hold and protect stream banks.

Using salt or low moisture feed blocks to distribute livestock can benefit riparian soils if cattle spend less time in riparian areas.

Effects of noxious weed treatment would be similar to those described under Sonoran Desert vegetation.

Hydrology/Riparian Vegetation/ Water Quality

Desired Condition

Existing condition of streams and riparian areas on these allotments is the result of cumulative effects of historic and recent management, natural disturbances, and the interaction between these two agents of change. Most stream channels on the allotments are in impaired or unstable condition (Mason and Johnson 1999). Indicators of these ratings are most commonly high width/depth ratio, lack of riparian vegetation and excessive sediment. Potential may have changed for some of the streams and the time necessary to reach potential is different for each stream depending on size of watershed, stream type, current condition and availability of water, soil and

remnant vegetation. Potential was determined by the few reference areas available including Arnett Creek near Superior, Arizona and No Name Spring on Sedow Allotment.

Stream Channel Potential

Channel stability is defined as the ability of a stream to carry the water and sediment of its watershed, while maintaining its dimension, pattern, and profile, without aggrading or degrading, over time and in the present climate (Rosgen 1996). The potential is for all stream channels to be stable, including a width/depth ratio and floodplain width that is within range for its potential, stable stream type. Stable stream types (Rosgen 1996) include A, B, C and E. Considering climate change in combination with the current instability of many of the streams, stability may be difficult and timely to achieve.

Riparian Vegetation Potential

Perennial and longer term intermittent streams: Potential for riparian vegetation varies by stream type. “A” type streams are steep, have little to no floodplain, do not depend on vegetation to dissipate energy, and typically have little riparian vegetation, but may support some of the species listed below. “B” type streams are moderately steep and have moderate sized floodplains. “C” type streams have a low gradient and a large floodplain. Both of these stream types should display a multi-storied riparian forest comprised of several age/size classes. Total canopy cover of trees and shrubs should be greater than 50 percent, with some thickets approaching 100 percent. Depending on elevation, tree species may include cottonwood (*Populus fremontii*, *P. angustifolia*), willow (*Salix gooddingii*, *S. laevigata*), ash (*Fraxinus velutina*), sycamore (*Platanus wrightii*), alder (*Alnus oblongifolia*), walnut (*Juglans major*), boxelder (*Acer negundo*).

The shrub component may include seep willow (*Baccharis salicifolia*), desert baccharis (*B. sergiloides*), coyote willow (*Salix exigua*), false indigo (*Amorpha fruticosa*), hackberry (*Celtis spp.*), buckthorn (*Rhamnus spp.*), burrobrush (*Hymenoclea monogyra*), tree tobacco (*Nicotiana glauca*), arrowweed (*Pluchea sericea*), hopbush (*Ptelea 94eticulate*), and grape (*Vitis arizonica*).

Deergrass (*Muhlenbergia rigens*) is an important plant for stabilization of the lower banks and floodplain. Tall fescue (*Schedonorus phoenix*) may play this role in higher elevation streams. In wetter streams, the deergrass may grow higher up on the floodplain leaving sedges (*Carex spp.*) to play the role of stabilizing the lower banks. The cover of these species should be greater than 50 percent and near 100 percent where there is an open tree canopy. Other herbaceous and aquatic species may include miner’s lettuce (*Claytonia perfoliata*), barnyard grass (*Echinochloa crus-galli*), watercress (*Nasturtium officinale*), monkeyflower (*Mimulus L.*), rushes (*Juncus spp.*), spikerush (*Eleocharis spp.*), American bulrush (*Schoenoplectus americanus*), cattails (*Typha L.*), horse tail (*Equisetum spp.*) and other sedges (*Carex spp.*). All these plants are important for stabilizing the channel, floodplain and lower banks and combined cover should be greater than 50 percent.

“E” type streams are found in meadow systems. They also have a low gradient and a large floodplain. They are rare though do occur on the Tonto NF. There may be streams in the project area which can attain this stream type. They usually have a low cover of trees, mainly willows, but near 100 percent cover of herbaceous and aquatic species.

Shorter term intermittent and ephemeral streams: Drier streams may support many of the tree species listed above including cottonwood, sycamore and walnut but with lower cover, and many of the shrub species especially hackberry and buckthorn. Deergrass cover should be above 50

percent. Desert willow (*Chilopsis linearis*) and desert broom (*Baccharis sarothroides*) are found in drier desert channels. There may be wetter spots within these channels that would support vegetation more similar to the wetter channels above. Drier channels are also dependent on upland species, which grow thicker in drainages, for stability.

Forest Service Manual (FSM) 2526.02 and 2526.03

- To protect, manage, and improve riparian areas while implementing land and resource management activities.
- To manage riparian areas in the context of the environment in which they are located, recognizing their unique values.
- Manage riparian areas under the principles of multiple-use and sustained-yield, while emphasizing protection and improvement of soil, water, and vegetation, particularly because of their effects upon aquatic and wildlife resources. Give preferential consideration to riparian-dependent resources when conflicts among land use activities occur.
- Give attention to land along all stream channels capable of supporting riparian vegetation (36 CFR 219.27e).
- Give special attention to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water. This distance shall correspond to at least the recognizable area dominated by the riparian vegetation (36 CFR 219.27e). Give special attention to adjacent terrestrial areas to ensure adequate protection for the riparian-dependent resources.

Arizona Department of Environmental Quality (ADEQ) has jurisdiction from the Environmental Protection Agency (EPA) to implement the Clean Water Act in Arizona. The Southwestern Region has a Memorandum of Understanding with ADEQ (2008) in which the Forest Service agrees to use Best Management Practices (BMPs) for on-the-ground projects.

Tonto NF Plan

- Coordinate with range to achieve utilization in the riparian areas that will not exceed 20 percent of the current annual growth by volume of woody species
- Coordinate with range to achieve at least 80 percent of the potential riparian overstory crown coverage
- Coordinate with range to achieve at least 50 percent of the cottonwood willow and mixed broadleaf acres in Structural Type I by 2030
- Rehabilitate at least 80 percent of the potential shrub cover in riparian areas through the use of appropriate grazing systems and methods
- Rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80 percent of the potential overstory crown coverage. Natural regeneration is anticipated to achieve most of this goal. Artificial regeneration may be necessary in some areas.
- Reestablish riparian vegetation in severely degraded but potentially productive riparian areas. Natural regeneration is anticipated to achieve this goal, but artificial regeneration may be necessary in some areas
- Rehabilitate cottonwood willow Type II (tall trees with little or no understory) to achieve conversion to Type I (tall trees with well-developed understory) by the year 2030. Natural regeneration is anticipated to achieve most of this goal, but artificial regeneration may be necessary in some areas.

- Goals and Objectives for Management Areas as described in appendix B of this document.

Desired condition of key reaches: the most common conditions limiting proper functioning condition of stream channels in the project area are high width-depth ratios, excessive erosion or deposition, and lack of riparian vegetation. Restoration and recovery of stream channel stability and proper functioning condition is dependent upon restoration and recovery of riparian vegetation.

Based on direction from FSH 2209.13, specific statements of desired condition should be developed for each allotment within the context of the Forest Plan. The following project-specific desired condition statements have been developed for riparian areas and stream channels, with the intent of achieving stream channel proper functioning condition (Barrett et al. 1993).

Desired conditions for key reaches include both short-term and long-term timeframes. The most important short-term desired conditions are to:

- Maintain residual herbaceous vegetation along the greenline or stream bank whenever precipitation is expected;
- Re-introduce riparian vegetation if native riparian species are absent;
- Minimize the annual impacts to seedling and sapling riparian woody species; and
- Limit physical impacts to alterable stream banks and greenlines.

The most important long-term desired conditions are to:

- Optimize riparian tree and shrub establishment, especially following episodic, regional winter storms;
- Increase density, vertical and horizontal canopy cover of woody riparian tree species;
- Increase the proportion of obligate and facultative riparian species;
- Maintain or increase canopy cover of herbaceous species to at least 50 percent (or 5 percent to 25 percent for reaches now at trace to 1 percent);
- Decrease the greenline to greenline width;
- Optimize the establishment of floodplains and stream banks; and
- Improve stream channel function and stability.

Key reaches are displayed on map 10A and would be approximate locations for monitoring for all action alternatives.

Existing Condition and Effects Analysis

Dominant vegetation: cottonwood, sycamore, Goodding's willow, Arizona grape, deergrass, sedges, hackberry (*Celtis 96eticulate*), desert willow

Noxious weeds: tamarisk (*Tamarix spp.*), giant reed (*Arundo donax*), tree of heaven

Rangeland management tools that may be used: seeding or planting native vegetation on recovering streambanks; deferred grazing or exclusion of grazing in impaired or recovering riparian areas; mechanical, biological or chemical treatment to reduce or remove noxious weeds; fencing; water development outside riparian areas.

Pastures containing riparian vegetation: Sedow- Hess, 4Y, Big Horse, Bronson, Brushy, Indian Gardens, Monument Trap, New Corral, Rock Springs Riparian, Sevenmile Riparian, Steer,

Storm Canyon ; **Hicks-Pikes Peak-** Hicks, Holly, Horseshoe Bend, Kenny, North Steer, Ortega, Rip, West; **Chrysotile-72,** Ash Creek Riparian, Boundary, Carol, Gleason Riparian, Home, Jackson, Poverty, Regal, Timber, Tony; **Haystack Butte-** Upper Ask Creek, Ash Creek, Bronson, East Steer; **Poison Springs-** Blevens, Klondike; **Dagger-** Lower Dry Creek, Upper Coon Creek, Oak Creek Mesa, West Devore, Dagger.

Water use by livestock: live water in creeks, seasonal water in “potholes,” spring boxes or horizontal wells on active springs, submersible pumps, and pipelines to storage tanks and troughs away from streams, storage tanks at spring developments with associated pipelines and troughs.

Of 374.14 miles of stream channels, including those named on the USGS topographic maps and those identified as supporting riparian vegetation on the National Wetland Inventory (NWI) maps, there are approximately 70 miles of stream channels that support obligate riparian vegetation (appendix A, map 10). Sixty-five riparian areas have been identified as having potential to improve within a relatively short period of time and are identified as key reaches for this project (appendix A, map 10a; appendix B). Stable (Mason and Johnson 1999), or properly functioning (Barrett et al. 1993), stream channels are dependent on their ability to resist forces of erosion (Janicke 2000) and will maintain their dimensions (width/depth ratio, gradient, and sinuosity) over time without excessive erosion or deposition (Rosgen 1996). A healthy riparian ecosystem contributes to channel stability by increasing resistance, thereby reducing flood peaks, trapping sediment and increasing groundwater recharge (Briggs 1996). Removal of vegetation would lower channel resistance to erosion and lead to increased frequency and magnitude of flood impacts (Trimble and Mendel 1995, Rosgen 1996, Janicke 2000).

On these allotments, most stream channels evaluated in the field are in unstable or impaired condition, in large part due to lack of riparian vegetation (appendix B). Riparian areas and springs have been relied upon as the primary source of livestock water for many years causing stream channels and adjacent riparian areas to receive concentrated grazing pressure. Large flood events in unstable or impaired channels can cause streams to “blow out;” i.e., experience significant riparian vegetation loss, down-cutting, erosion, and aggradation.

Wild and Scenic Rivers

Two streams in the project area have been classified as potentially eligible rivers for inclusion into the National Wild and Scenic Rivers System (U.S. Forest Service R3 1993). The Outstandingly Remarkable Values (ORVs) are listed in table 05 below and there are criteria established to describe these ORVs (appendix B). Forest Handbook direction is to manage potential wild and scenic rivers to protect their indicated ORVs (FSH 1909.12, Chapter 80).

Table 6: Potentially eligible streams for inclusion into the National Wild and Scenic Rivers System

Stream Name	Location	Classification	ORVs
Pinto Creek	From southern pasture boundary downstream 1 mile	Scenic	Scenic, Riparian, Ecological
Salt River – segment 1a	From the east boundary of the Tonto NF to the NE boundary of the Salt River Canyon Wilderness	Scenic	Scenic, Geologic, Wildlife, Recreational, Ecological

Stream Name	Location	Classification	ORVs
Salt River – segment 1b	From the NE boundary of the Salt River Canyon Wilderness to the west boundary of the Ft. Apache Indian Reservation	Wild	Scenic, Geologic, Wildlife, Recreational, Ecological
Salt River – segment 2a	From the west boundary of the Ft. Apache Indian Reservation to the SW boundary of the Salt River Canyon Wilderness	Wild	Scenic, Geologic, Wildlife, Recreational, Ecological
Salt River – segment 2b	From the SW boundary of the Salt River Canyon Wilderness to the SR 288 bridge	Scenic	Scenic, Geologic, Wildlife, Recreational, Ecological

Water Quality

The Arizona Department of Environmental Quality (ADEQ) evaluates water quality status of waters within the state in a Nonpoint Source Assessment Report (2011a). Six water bodies within the project area have been monitored by ADEQ (table 5). Salt River from Pinal Creek to Roosevelt Lake is rated Impaired due to exceedence of the suspended sediment, nitrogen and phosphorus criterion for aquatic and wildlife-warm water fisheries (A&Ww) and *E. coli* criterion for full body contact recreation (FBC). A total maximum daily load (TMDL) study is scheduled to begin in 2015 (ADEQ 2011b). All other uses are Attaining.

Cherry Creek and Coon Creek are rated Attaining Some Uses because of inconclusive sampling for A&Ww and FBC due to the lack of seasonal coverage for *E. coli*, phosphorus and nitrogen. All other uses are Attaining.

Lower Pinal Creek was first listed as Impaired by ADEQ in 1988 for copper, manganese, zinc, and low pH (ADEQ 2011a). Consequently, a water treatment plant was constructed on Pinal Creek at SR 188. Groundwater is pumped from the creek to interrupt the flow then water is treated and returned to the creek. Pinal Creek was delisted in 2002 (ADEQ 2011a). The reach of creek from the treatment plant to the Salt River is now Attaining Some Uses. The data was inconclusive because of one exceedence of the criterion for each of cadmium, copper, dissolved oxygen and bottom deposits for A&Ww. All other uses are Attaining.

Pinto Creek, from West Fork Pinto Creek to Roosevelt Lake remains Impaired for the selenium criterion for A&Ww. It is also Not Attaining the copper standard for A&Ww because even though a TMDL has been completed and is being implemented, there are still exceedences due to high natural background levels. A TMDL for selenium is scheduled to begin in 2013 (ADEQ 2011b). All other uses are Attaining.

Roosevelt Lake is listed as Attaining Some Uses by ADEQ (2011a) due to inconclusive sampling for A&Ww, FBC, DWS, AGL and AGI. However, the lake was added to the 303d list of impaired waters by the U.S. Environmental Protection Agency (EPA) for fish consumption (FC) due to exceedence of the narrative water quality standards for mercury in fish tissue. A fish consumption advisory is currently in place (EPA 2009). A TMDL is scheduled to begin in 2014 (ADEQ 2011b).

Table 7: List of water bodies monitored by ADEQ and their designated uses

Stream Name	Designated Uses	Overall Assessment
Salt River – Pinal Creek to Roosevelt Dam	A&Ww, FBC, FC, AGI, AGL	Impaired
Cherry Creek – Fourmile Canyon to Salt River	A&Wc, FBC, FC, AGI, AGL	Attaining some uses
Coon Creek – 10.1 miles to Salt River	A&Ww, FBC, FC, AGL	Attaining some uses
Pinal Creek – lower Pinal Creek WTP discharge to Salt River	A&Ww, FBC, FC, AGL	Attaining some uses
Pinto Creek – West Fork Pinto Creek to Roosevelt Lake	A&Ww, FBC, FC, AGI, AGL	Impaired (selenium) Not attaining (copper)
Roosevelt Lake	A&Ww, FBC, FC, DWS, AGI, AGL	Impaired

A&Ww - aquatic and wildlife-warm water fisheries

A&Wc - aquatic and wildlife-cold water fisheries

FBC - full body contact recreation

FC - fish consumption

DWS - domestic water source

AGI - agricultural irrigation

AGL - agricultural livestock watering

Environmental Consequences - Alternative 1 (No Grazing)

Direct Effects: Riparian areas are generally regarded as having high inherent potential for recovery from disturbance (Milchunas 2006). Stream channel and riparian area recovery are considered optimal when direct effects of livestock grazing are eliminated (Clary and Kruse 2003). Amount of time required for riparian recovery after severe degradation can vary from several years to decades (Clary and Kruse 2003). Recovery is dependent on size and existing condition of the watershed, stream channel and riparian area (flow regime, channel gradient, dominant channel substrate, watershed area, type and extent of riparian vegetation), future management, and climate and natural disturbances (Kindschy 1987 and 1994). Most rapid recovery can be expected in channels with small watersheds, perennial flow or sub-surface flow, an existing source of riparian vegetation, and availability of fine sediments. Eliminating livestock grazing could eliminate the need for moving water from springs and streams into storage tanks. Not piping water away from riparian areas would have the beneficial effect of leaving water in the stream for the riparian vegetation. This could facilitate an increase in the density, cover and area of riparian vegetation, especially at springs and streams with low flows.

Indirect Effects: No grazing usually provides the most rapid increase of upland vegetative cover, species diversity, and improvement of impaired and unsatisfactory condition soils. These changes reduce surface runoff, dampen peak flows, and decrease the probability of channel adjustments, impacts to riparian vegetation and loss of channel function. Implementation of this alternative should maintain or improve existing condition of upper watersheds.

Cumulative Effects: direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) such as management tools proposed in alternative 3, should result in reaching desired conditions at the fastest rate. As stated

in direct effects, potential for recovery and rate of recovery would vary by key reach. Where there is potential for recovery of riparian vegetation, eliminating the direct and indirect effects of livestock grazing and water developments should allow the most rapid rates of recovery. Where riparian vegetation is meeting desired conditions this alternative would provide the most protection for maintaining desired conditions. Invasive trees such as salt cedar have enjoyed a certain competitive advantage in past years, with domestic livestock preferentially browsing on the more palatable cottonwood and willow seedlings & saplings. Salt cedar is already present on Salt River in large amounts. In certain sites where the Forest decides to remove invasive trees, alternative 1 would allow native trees such as cottonwood and willow to passively re-vegetate.

A No Grazing Alternative eliminates direct and indirect effects of cattle grazing to recovering stream channels, riparian areas and watersheds within the allotments. This alternative meets the intent of Forest Plan direction to protect, manage, and restore riparian areas.

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects: Cattle tend to congregate in riparian areas. They favor riparian forage and water availability, shade in warm months and gentle topography. Excessive grazing, trampling and trailing impacts can destabilize and break down stream banks, cause mechanical damage to shrubs and small trees, reduce or eliminate woody seedlings and saplings, expose soils, eliminate or shift native herbaceous species to weedy or exotic species with reduced root systems, and cause widening or incision of stream channels (Trimble and Mendel 1995, Clary and Kruse 2003). These changes may lead to loss of stream stability and function (Rosgen 1996). Stream channel profile, stream bank stability, streamside vegetation, channel bottom embeddedness, stream sediments and stream temperature are all aquatic species habitat features that can be directly or indirectly affected by livestock grazing practices.

Maintaining native obligate riparian plants is extremely important to many streams because of their resistance to the erosive energy of flowing water (Clary and Kruse 2003). Herbaceous riparian vegetation is especially important to stabilizing stream bank, point bar and floodplain deposits. Development of these features is critical to the channel restoration process (Clary and Kruse 2003).

One of the most important factors influencing riparian conditions is utilization (Mosley et al. 1999, Clary and Kruse 2003). Existing condition of riparian areas, riparian vegetation utilization, residual vegetation heights and availability of off-channel water developments are elements most likely to affect riparian area and stream channel condition and recovery. Riparian utilization guidelines were developed to maintain or increase existing riparian vegetation. Under current management, Annual Operating Instructions (AOIs) recommend mitigating direct effects of livestock grazing in key reaches by using riparian utilization measurements (implementation monitoring) (ITT 1999, Burton et al. 2011). If riparian area utilization guidelines are followed and cattle are moved when use guidelines are met, undesirable direct effects of grazing would be minimized and riparian area and stream channel condition should improve. This mitigation measure should be effective for key reaches as shown in appendix B (table 1) labeled as “Yes” in the column Manage by Monitoring.

However, utilization guidelines were not intended for riparian areas that have potential to support riparian vegetation but do not, or support very low cover or density of riparian vegetation. Clary and Webster (1989) recommend that grazing riparian areas in early seral condition be deferred until riparian vegetation re-establishes and ecological status improves. Because riparian

vegetation on channels categorized as “No” is low in density or in early seral condition, riparian utilization measurements may not effectively identify thresholds of unacceptable impact that would trigger moving cattle from riparian areas or pastures, or use levels may be reached quickly. These channels do have potential to support riparian tree seedlings and an herbaceous understory and should be rested until riparian vegetation has become re-established. At that time they would then be managed using riparian utilization measurements (implementation monitoring).

Under this alternative, pastures that provide access to Salt River are not grazed. This alternative would have the same effects as alternative 1 for Salt River and other key reaches located in pastures not being grazed under alternative 2.

Indirect Effects: Stream channels and riparian areas can be affected indirectly by watershed condition and/or stream channel conditions above and below the stream reach of interest. Soil compaction, decreased infiltration, and loss or alteration of upland vegetation can cause increased runoff and higher peak flows, leading to channel adjustments and decrease in stream function (Gori and Backer 2005). Grazing of impaired and unsatisfactory condition uplands may slow rates of upland recovery, indirectly slowing rates of riparian area and stream channel recovery from scouring effects of increased runoff and higher peak flows. If management prescriptions are followed and cattle are moved when use guidelines are met, undesirable, indirect effects of grazing would be minimized. Some pastures with high amounts of impaired or unsatisfactory soils are not being grazed in this alternative. Not grazing these pastures would have the same indirect effects on riparian areas and stream channels as alternative 1 (see soils section). If grazing levels are excessive in riparian areas, invasive trees that are less palatable, such as tree of heaven and salt cedar may be relieved of competition from native trees that are more palatable, such as cottonwood and willow. Mitigation measures should prevent this from occurring.

Cumulative Effects: historic overgrazing, historic mining and associated timber removal, unauthorized livestock from adjacent allotments and other lands, invasive species such as tamarisk, recreational activities such as camping, public sand and gravel pits, cross-country travel, road development, climate changes, water extraction (by permittees and by private water rights holders). Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), are likely to result in attainment of desired conditions for riparian areas labeled “Yes” in the Manage by Monitoring column of table 1, appendix B, but at a slower rate than for alternative 1. If key reaches labeled “No” are rested until they regain sufficient accessible, palatable riparian vegetation to use annual use monitoring guidelines to manage them, they too are likely to attain desired conditions. If they are grazed before they regain sufficient accessible, palatable riparian vegetation, it is unlikely they would improve or attain desired conditions. Riparian areas in pastures being excluded in this alternative, including the Salt River, would move toward or attain desired conditions at the same rate as alternative 1. In this alternative 47 key reaches will potentially be grazed by livestock.

This alternative should meet the intent of Forest Plan direction to protect, manage, and restore riparian areas if described mitigation measures are successful. Mitigation measures have a high probability of success for key reaches in table 1, appendix B labeled “Yes” in the Manage by Monitoring column. If the key reaches in table 1, appendix B labeled “No” in the Manage by Monitoring column are rested until they regain sufficient accessible, palatable riparian vegetation to use the annual use monitoring guidelines to manage them, they will also have a high probability of success.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects: see discussion of direct effects under alternative 2 (above). Riparian utilization guidelines would be effective for the key reaches in appendix B (table 2) labeled as “Yes” in the column Manage by Monitoring. Because riparian vegetation on channels categorized as “No” is low in density or in early seral condition, riparian utilization measurements may not effectively identify thresholds of unacceptable impact that would trigger moving cattle from riparian areas or pastures, or use levels may be reached quickly. Salt River corridor presents a challenge to monitor since riparian vegetation occurs on small, sandy beaches. Once in the corridor, cattle tend to congregate on these beaches since there is nowhere else to go. As a result, beaches can become highly impacted very quickly.

One conservation measure in the preferred alternative is to limit use on Salt River to the winter season for protection of Southwest willow flycatcher populations. Generally, livestock do not browse riparian trees or shrubs once leaves have dropped in winter and before they break bud in the spring. The elevation on the Salt River within the project area ranges from about 3200 feet to 2200 feet, therefore this period could be very brief especially at lower elevations. Cattle browse dormant riparian trees and shrubs if other more palatable forage is not easily available. Herbaceous plants may not go dormant at low elevations and would likely remain palatable and be grazed.

Indirect Effects: see discussion of indirect effects under alternative 2 (above). Since all pastures are proposed for grazing, this alternative would have greater undesirable indirect effects to riparian areas than alternative 2. Salting away from stream channels and herding are important management practices to help limit use in riparian areas.

Cumulative Effects: direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), are likely to result in attainment of desired conditions for riparian areas labeled “Yes” in the Manage by Monitoring column of table 2, appendix B at the same rate as alternative 2, but at a slower rate than alternative 1. If key reaches labeled “No” are rested until they regain sufficient accessible, palatable riparian vegetation to use annual use monitoring guidelines to manage them, they too are likely to attain desired conditions at the same rate as alternative 2, but at a slower rate than alternative 1. If they are grazed before they regain sufficient accessible, palatable riparian vegetation, it is unlikely they would improve or attain desired conditions. Due to the nature of Salt River corridor and difficulty in monitoring it, and presence of tamarisk, native riparian vegetation on beach areas where cattle tend to congregate is unlikely to recover. Successful re-introduction of American bulrush and deergrass is an important step toward restoring riparian areas and recovering riparian area condition. With continued drought and higher temperatures, in combination with piping water away from riparian areas for use by cattle, it is likely that smaller springs may dry up. There may be mortality of riparian vegetation even on larger springs. Mechanical and fire treatments to reduce fuels may cause short term sedimentation but should be beneficial over the long term by improving watershed conditions and reducing the chances of a catastrophic wildfire.

Direct effects to water quality: Three water bodies within the project area are rated Impaired by ADEQ, the Salt River (suspended sediment, nitrogen, phosphorus and E. coli), Pinto Creek (selenium) and Roosevelt Lake (mercury) (ADEQ 2011). Our management cannot cause further degradation of the impaired standards in these water bodies (A.A.C. R18-11-107). Cattle grazing or crossing streams can introduce suspended sediment, nitrogen and E. coli into the water

(Davies-Colley and Nagels 2004). Cattle grazing along the Salt River have the potential to contribute to the impairment of the suspended sediment, nitrogen and E. coli standards.

Direct effects to Wild and Scenic Rivers: A 1979 Presidential Directive instructs Federal agencies to “take care to avoid or mitigate adverse effects on rivers identified in the Nationwide Inventory” (Speth 1980). Grazing on the Salt River would be challenging to monitor due to the difficult accessibility and small areas covered by riparian vegetation where cattle tend to congregate.

Effects of vegetation management tools:

Direct effects of grazing/browsing to reduce seed propagation: This tool is not intended to be used in riparian areas. Therefore riparian utilization guidelines would apply to this tool and effects would be the same as for the direct effects of grazing discussed above for this alternative.

Indirect effects of grazing/browsing to reduce seed propagation: indirect effects of this action would be the same as for indirect effects of grazing.

Direct effects of short duration/high intensity grazing: This tool is not intended to be used in riparian areas. Paddocks created to implement this tool would avoid riparian areas; therefore there would be no direct effects.

Indirect effects of short duration/high intensity grazing: indirect effects of this tool on riparian areas would depend on the size of the area treated; the success of grass seeding and whether there is an increase or decrease in infiltration rates after the treatment. If there is a good response from seeding and infiltration rates decrease, runoff could decrease and lower peak flows, reducing erosion rates in channels. If there is little to no response from seeding or infiltration rates increase there could be increased runoff and higher peak flows, increasing erosion rates in channels. An increase or decrease in runoff from a small area may have little impact on a stream channel. Increased runoff from a large area could cause an increase in channel erosion and loss of riparian vegetation. Decreased runoff from a large area could decrease channel erosion.

Direct effects of fencing: Because of their accessibility, vulnerability or importance, key reaches proposed for exclusion by fencing are: Knoles Hole Spring, Armor Corral Spring, Montag Spring and Carol Spring. The following key reaches are already fenced and would not be grazed: Ash Creek (Ash Creek Riparian Pasture) and Walnut Canyon (Walnut Riparian Pasture). Once these riparian areas are excluded from grazing, effects would be the same as for alternative 1.

The following key reaches, because of their small size or vulnerability, may be difficult to manage by monitoring: Chalk Creek, Coon Creek and Bill Lee Spring (Upper Coon Creek Pasture), Blevens Wash, Rock House Spring. If it is found that they cannot be successfully managed by monitoring, it is proposed to exclude them with fencing. If excluded from grazing, effects would be the same as for alternative 1.

Several fences are proposed on the Hikes-Pikes Peak Allotment to split existing pastures. Construction of fences would not adversely impact riparian areas or stream channels.

Indirect Effects of fencing: By fencing these riparian areas, there may be more concentrated use at remaining waters in a pasture. However, in most cases, water would be provided outside the fenced areas. In these cases, impacts to riparian areas are listed in direct effects of water developments (below).

Direct effects of water developments: Construction of pipelines, storage tanks and wells would not adversely impact riparian areas or stream channels. Most troughs (or drinkers) would be located outside the riparian area which could have the positive effect of drawing cattle away from riparian vegetation and stream channels. Storage tanks and troughs would be supplied by wells and springs. As discussed above, removing water from springs would reduce water available for riparian vegetation and may cause mortality or reduce the likelihood of stream channel and riparian area recovery. Impacts would be less or negligible if water is taken from wells located away from streams and springs. Proposed stock tanks are trick tanks or saddle tanks, which collect rain water and would have no direct effects on riparian areas.

Troughs proposed within or near a riparian area would have a detrimental effect on the riparian area by drawing cattle to the riparian vegetation (appendix B). Wells located in or near stream channels have the potential to pump surface water, reducing the amount of water for riparian vegetation (appendix B).

Indirect Effects of water developments: Supplying water in new areas may cause heavy use in those areas.

Direct effects of erosion control structures: No specific channels or structures have been proposed for treatment at this time. Therefore direct and indirect effects of this alternative cannot be analyzed. For general effects, see discussion above.

Direct effects of planting native vegetation: No specific sites have been identified for planting. Planting riparian herbaceous species, like American bulrush and deergrass, could be a critical step in riparian area and stream channel recovery. These plants have a high tolerance for grazing. Their potential to expand in area may be affected by grazing use. Where re-introduction is successful, it should facilitate the rebuilding of stream banks.

Indirect effects of planting native vegetation: Where re-introduction is successful, it could reduce the amount of downstream sedimentation and facilitate the recovery of a functioning channel.

Direct effects of noxious weeds and invasive plants treatments (chemical and biological): No specific sites have been identified for treatment. The most extensive population of invasive plants occurring in riparian areas in the project area is tamarisk on Salt River. Effects of treating tamarisk on Salt River are addressed in the Integrated Treatment of Noxious and Invasive Weeds Environmental Assessment.

Direct Effects of timber/fuelwood sales (mechanical treatments): This tool is not intended to be used in riparian areas. There may be impacts from stream crossings; however no specific areas have been identified for treatment so direct effects cannot be analyzed.

Indirect Effects of timber/fuelwood sales (mechanical treatments): Mechanical disturbance from timber treatment activities which disturb or remove the existing vegetation, litter and humus from the soil surface and cause compaction of underlying soils would result in short term increases in erosion and sediment from disturbed areas, and may cause changes in the timing, magnitude and quantity of stream flows which could adversely affect stream morphology. Thinning of trees and removal of brush would reduce the risk that wildfire would spread and would have long term watershed benefits.

Buffer strips are stream-side corridors of no management intended to provide a strip of undisturbed vegetation and litter between areas disturbed by treatment activities and stream channels. Filter strips (Streamside Management Zones) are stream-side corridors of limited treatment. These strips act as filters to trap sediments eroded from disturbed areas.

Direct Effects of fuels reduction (prescribed fire): This tool is not intended to be used in riparian areas; however it is possible that a prescribed fire may enter a riparian area. Direct effects would consist mainly of damage to vegetation (trees, shrubs, and grasses) and partial consumption of the underlying litter layer. Severity of damage depends largely on intensity of the fire. Intense fires can cause severe damage to plant cover while low intensity cool-burning prescribed fires may have minimal effects.

Indirect Effects of fuels reduction (prescribed fire): Successful implementation of prescribed burns should have little impact on water quality or water yield. Greater potential for watershed impacts exists from prescribed burning of chaparral than from ponderosa pine or mixed conifer due to higher intensity burning and greater consumption of vegetation. Impacts that could result from chaparral burns include increased erosion and sedimentation, and increased peak flows. Impacts should be short lived due to resprouting of burned juniper and recruitment of herbaceous vegetation. A fuels management program intended to reduce the risk of catastrophic wildfires in the future should have long term watershed benefits.

Filter strips and Streamside Management Zones are intended to provide a strip of undisturbed vegetation and litter between areas disturbed by treatment activities and stream channels. These strips act as filters to trap sediments eroded from disturbed areas. With the use of BMPs to reduce impacts to streams, overall effects of this alternative should be positive.

This alternative should meet the intent of Forest Plan direction to protect, manage, and restore riparian areas if the described mitigation measures are successful. Except for the Salt River, mitigation measures have a high probability of success for the key reaches in table 2, appendix B (existing condition) labeled “Yes” in the Manage by Monitoring column. If the key reaches in table 2, appendix B (existing condition) labeled “No” in the Manage by Monitoring column are rested until they regain sufficient accessible, palatable riparian vegetation to use the annual use monitoring guidelines to manage them, they will also have a high probability of success. Due to the nature of the Salt River corridor and the difficulty in monitoring it, riparian vegetation on beach areas where cattle tend to congregate would be unlikely to meet the intent of the Tonto NF Plan.

Environmental Consequences - Alternative 4 (Habitat Optimization)

Direct Effects: The effects of this alternative on key reaches would be the same as for alternative 1.

Indirect Effects: Seasonal grazing would provide for better distribution (see soils report) so would be somewhat better than alternatives 2 and 3 for key reaches in the pastures that are grazed. For key reaches in the Oak Creek Mesa Pasture, the effects would be the same as for alternative 1.

Direct Effects of no spring developments: Not piping water away from riparian areas would have the beneficial effect of leaving water in the stream for riparian vegetation. This could facilitate an increase in density, cover and area of riparian vegetation, especially at springs and streams with

low flows. Cattle would continue to drink directly from the spring and continue to have an impact on the riparian vegetation and channel near the spring.

Indirect Effects of no spring developments: There would be no indirect effects

Cumulative Effects: The direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, should result in reaching desired conditions for more key reaches than alternatives 2 and 3 at a faster rate than alternatives 2 and 3 but at a slower rate than for alternative 1.

Fire and Fuels

Desired Condition

Historically, fire has played a significant role in the ecology of the Southwest. A high occurrence of lightning throughout the region supports frequent wildfire ignitions during the period from late spring through summer. Native Americans were known to have used fire for hunting, brush clearing, and other purposes. The advent of European settlement during the late 19th century brought livestock grazing and other land management activities, which significantly modified existing vegetation. The ability for fire to spread and affect large areas across the landscape was significantly reduced. In addition, aggressive fire suppression policies adopted by state and federal land management agencies virtually eliminated the role of fire from natural ecological processes. In many cases, ecosystems that exist today are very different from those where fire was once an integral part of the landscape (Allen 1996).

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human intervention but including the influence of aboriginal burning (Agee 1993, Brown and McDonald 1995). Five natural fire regimes are classified based on average number of years between fires (i.e., fire frequency or Mean Fire Interval [MFI]) combined with severity of the fire (e.g., amount of vegetative replacement) and its effects on dominant overstory vegetation. The five natural fire regimes are: I -0-35 year frequency and low severity to mixed severity; II -0-35 year frequency and high severity; III -35-200+ year frequency and mixed severity; IV -35-200+ year frequency and high severity; V -200+ year frequency and low to high severity.

Fire regime condition class (FRCC) measures degree of departure from reference conditions, possibly resulting in changes to key ecosystem components, such as vegetation characteristics (i.e., species composition, structural stage, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity and pattern; and other associated disturbances, such as insect and disease mortality, grazing and drought. Possible causes of this departure include (but are not limited to) fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, and introduced insects and disease (Schmidt et al. 2002). Three fire regime condition classes are based on no or low (FRCC 1), moderate (FRCC 2) and high (FRCC 3) departure from the central tendency of reference conditions (Hann and Bunnell 2001, Hardy et al. 2001, and Schmidt et al. 2002). The central tendency is a composite estimate of reference condition vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated natural disturbances.

Characteristic vegetation and fuel conditions are considered those that occurred within the natural fire regime, such as those found in FRCC 1 (low departure). Uncharacteristic conditions are

considered to be those that did not occur within the natural regime, such as are often found in FRCC 2 and 3 (moderate to high departure). These include (but are not limited to): invasive species (weeds and insects), disease, “high graded” forest composition and structure (i.e., large fire tolerant trees have been removed and small fire-intolerant trees have been left within a frequent surface fire regime), or repeated annual grazing that reduces grassy fuels across relatively large areas to levels that would not carry a surface fire.

The long-term goal for fire management on the Tonto National Forest (Tonto NF) is to re-introduce fire back into fire dependent ecosystems, and allow it to resume its natural role (Hart et al. 2010). This would most likely be accomplished through the combined use of prescribed fire, mechanical treatments, and managing wildland fire for resource benefit. Prescribed fires can be used to mimic naturally occurring fire, enhance native plant species, control invasive plants, provide forage and habitat for wildlife, contribute to nutrient cycling, and create diversity in vegetative structure and distribution. Mechanical treatments are useful in areas where effects of prescribed fire are not acceptable, but once applied may set the stage for future fire use. Managing wildland fire for resource benefit allows managers the option to take appropriate management response (suppress, contain or confine) to naturally ignited wildland fires to accomplish specific resource objectives in predetermined areas.

Over time, restoring fire to fire-dependent ecosystems would shift areas currently classified as FRCC 3 (high departure from natural conditions) to FRCC 1 and 2 (low to moderate departure), while serving to maintain those areas already in FRCC 1. Reference conditions are the baseline for determining departure from the natural or historical range (i.e., condition class).

Objectives include the following:

- Reduce the threat of unnatural crown fires through restoration, moving plant communities towards natural fire regimes. Natural fire regime is the fire regime that existed prior to human-facilitated interruption of frequency, extent or severity.
- Plan for greater diversity across the landscape, diversity in terms of structure, composition, and variable densities. Allow for varied habitat conditions of different wildlife species and for distribution of vertical size classes in varying densities.
- Protect or enhance sensitive plant communities and limited habitats. Comprehensive forest restoration requires balancing fire risk with retention of forest structures necessary for canopy dependent species.
- Manage understories of grass, forbs, and shrub by controlling grazing. Robust understories are necessary to restore natural fire regimes and to limit excessive tree seedling establishment. Concentrated, intensive grazing can be in excess of capacity, causing damage. Allowing timely recovery may repair damaged sites or even prevent damage. Grazing can also be applied as a management tool to improve conditions.
- Manage for Air Quality on both prescribed burns and unplanned ignitions.

Prescribed Fire Treatments

- **Broadcast Burning-** Under an approved Burn Plan, areas can be treated to reduce fuel loadings and create a mosaic pattern in the landscape by broadcast burning.
- **Pile Burning** - following mechanical treatments. Some areas would require mechanical fuels reduction work before prescribed fire can safely be applied. Disposal/removal of the created slash is part of the fuels reduction job.

- **Maintenance Burning** - subsequent entries at regular intervals (every 5 to 15 years) to maintain desired conditions.
- **Group Selection Cuts** – Reductions in densities. An improved distribution of size classes and a reduction in total crown bulk density.

Mechanical Treatments

Thin From Below - Understory thinning of vegetation with maintenance of regrowth. The following may be cut in order to achieve objectives (i.e., spacing). Guidelines are:

- All ponderosa pine, white fir and Douglas fir trees up to 18 inches diameter at breast height (dbh).
- Dead ponderosa pine, white fir and Douglas fir trees up to 18 inches dbh.
- Live and dead Arizona white oak, turbinella oak, and other oaks up to 10 inches diameter at root collar (drc).
- Live and dead Gambel oak up to 5 inches drc.
- All live and dead juniper species up to 20 inches drc.
- All brush species except Madrone.

Residual stocking levels for sites with predominately ponderosa pine, white fir and Douglas fir overstory vegetation type would be reduced to 50 to 80 trees per acre (not below 50 square feet of basal area/acre in groups, not below a total stand BA of 30 sq. ft. - allowing for the creation of openings). In areas that are predominately juniper/oak woodland vegetation type, residual-stocking levels would range from 30 to 80 trees/plants per acre (not below 20 square feet of basal area/acre). Thinnings are likely to be scheduled on a 10 to 30 year return interval.

Shaded Fuel breaks - A strategically located break in the continuity of fuels, treated but not completely cleared. Removal of brush and ladder fuels. Larger, more fire resistant, overstory trees, are not cut. All dead standing trees, of any size, would be cut down.

Overstory Tree Removal - applied on a limited basis where needed to compliment the overall goals of improving growing conditions and creating openings. Using a density management regime between 15 and 35 percent of max SDI (Stand Density Index), prescriptions for individual project areas can be developed to maintain representation in all size classes.

Existing Condition and Effects Analysis- Sonoran Desert Vegetation Type

In 2010, a national effort was launched to assess the condition of all 6th code watersheds on Forest Service land. Twelve attributes were assessed. Attributes that may be affected by this project are: Water Quality, Water Quantity Condition, Aquatic Habitat Condition, Aquatic Biota Condition, Riparian/Wetland Vegetation Condition, Soil Condition, Fire Effects and Regime, Forest Cover, Rangeland, and Terrestrial Invasive Species. The results of the assessment for the 6th code watersheds in the project area are listed in appendix F.

Very little research exists on fire ecology of upland Sonoran Desert. However, given the recent history of large fires that have occurred throughout desert portions of the Tonto NF, it is apparent that more dominant plant species (giant saguaro and foothill palo verde) associated with this ecosystem are very intolerant of fire (Narog et al. 1995). Post fire studies indicate mortality rates may approach 80 to 100 percent in mature stands of saguaro and palo verde (Wilson et al. 1996).

The introduction and expansion of non-native plant species, especially grasses, has changed the characteristics of the fuel bed. In many locations on the Tonto NF, the combination of herbaceous

and shrub layers, including many introduced species, form a nearly continuous and highly flammable fuel component in the Sonoran Desert. This is especially evident during abnormally wet precipitation cycles. The Sonoran Desert vegetation type most closely identifies with fire regime group III, infrequent (35 to 100 yrs.) mixed severity fires. Mean fire interval is about 75 years with high variation due to year-to-year variation in shrub mortality and grass and forb production related to drought and moisture cycles combined with variation in ignitions and associated fire weather. The Sonoran Desert community within two allotments has seen one large fire in the past forty years, the 1980 Cherry Fire (1,665 acres) on Dagger Allotment.

Environmental Consequences - Alternative 1 (No Action)

Non-native grasses would grow without grazing pressure and would increase the possibility of high intensity fire in this vegetation type, which is not fire-adapted. If fire frequency increases, opportunity exists for a vegetative type conversion, as non-native plant species would out-compete native, non-fire adapted plants. The fire regime may move from III (mixed severity) to II (high severity). Mean fire interval may move from 75 years to a more frequent interval. Larger fires would produce more smoke, which may impact human populations and designated smoke-sensitive areas.

Cumulatively, there is an increased chance of fire due to fuels accumulation and visitor use, which can increase probability of fire ignitions. Increased ignitions and larger, fast moving fires in this fuel type may exceed emergency response capabilities and may impact human populations and threaten structures and developments. Wildlife grazing may reduce some fuel loading. Noxious weed management may reduce fuel loading, reducing chances of fire.

Environmental Consequences - Alternative 2 (Current Management)

Fire activity should stay at its current level due to grazing of non-native grasses. Grazing reduces non-native fuel loads only when fuels are green and palatable.

Environmental Consequences - Alternative 3 (Proposed Action)

Wildfire activity should stay at its current level due to grazing of non-native grasses. Grazing reduces non-native fuel loads only when fuels are green and palatable.

Historic livestock grazing and other land management activities significantly modified existing vegetation. The ability for fire to spread and affect large areas across the landscape was significantly reduced. Continued grazing reduces fine fuels and limits fire spread in many vegetation types. Managed grazing where use is regulated to acceptable levels resulting in healthy grass stands can produce expected/ repeatable fire effects.

Consistent herbaceous cover can produce fast moving fires (short duration) that limit brush and tree re-establishment, reduce ladder fuels (torching), and ensure fire moves as a ground fire versus a crown fire. Grass cover can compete against conifer regeneration when the reproduction is not wanted, either because of timing or stocking issues. Understories can be maintained by repeated fire at regular intervals.

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

A seasonal grazing strategy may help reduce the threat of wildfire to Sonoran Desert vegetation by utilizing cattle grazing at times when non-native grasses and forbs are palatable. Grazing would be most beneficial in areas along human travel routes and around recreation areas where most human-caused fires start.

Using game and non-game species habitat prescriptions to optimize forage and production would benefit fire regimes when implemented under conditions that mimic natural mean fire intervals and fire regimes.

Reintroduction of special status species may determine when and where mechanical treatments, prescribed burning, and use of multiple objective fires are implemented or allowed.

Existing Condition and Effects Analysis- Semi-desert Grassland

Semi-desert grasslands are typically found on Dagger and Poison Springs allotments in the foothills where Sonoran Desert transitions to mountain landforms. This vegetation type falls into fire regime group II, characterized by frequent (0 to 35 yrs.) stand replacement fires. The mean fire interval is about ten years with a high variation due to drought, which reduces fire frequency and moist periods that increase fire frequency.

Grazing of grassy fuels by livestock may also influence fire mosaic patterns in this vegetation type (Hann et al. 2003). Although there have been several large fires in this vegetation type over the past forty years on Dagger and Poison Springs Allotments (1975 Byrns Fire at 250 acres, 1995 Medicine Fire at 800 acres, 1995 Parallel Fire at 400 acres, 2006 Chalk Fire at 514 acres, 2009 Salt River Fire at 195 acres), mean fire return interval over the entire landscape is too infrequent to meet reference conditions.

Environmental Consequences - Alternative 1 (No Action)

Mean fire return interval may return to normal (approximately 10 years) with no grazing and normal precipitation. Invasive plant species may be pushed back due to increased fire interval. Larger and more frequent fires due to increased fuel availability would produce more smoke which may impact human populations and designated smoke-sensitive areas. With normal precipitation there may be an increase in fire ignitions as a lack of cattle grazing increases fuel loading and the higher probability of lightning ignitions and forest visitor ignitions.

Environmental Consequences - Alternative 2 (Current Management)

Fire activity should remain at current levels, if current grazing management continues. Cattle grazing and drought would affect the amount of available vegetation for wildland fire to carry across the landscape.

Lack of fire would extend the mean fire interval beyond 10 years which may alter the fire regime of this ecosystem and allow for an increase in woody plants altering the vegetation type. Continuation of current management may move this vegetation type towards a Fire Regime Condition Class 3 (FRCC3).

Environmental Consequences - Alternative 3 (Proposed Action)

See effects as described for alternative 3, Sonoran Desert.

Fire activity should remain at current levels. Cattle grazing and drought would affect the amount of available vegetation for wildland fire to carry across the landscape.

Lack of fire would extend the mean fire interval beyond 10 years, which may alter the fire regime of this ecosystem and allow for an increase in woody plants altering the vegetation type. Continuation of current management may move this vegetation type towards a Fire Regime Condition Class 3 (FRCC3).

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

A seasonal grazing strategy may reduce available fuel loads for prescribed burns. Prescribed burning dates and grazing rotations would need to be coordinated to benefit each function.

Using game and non-game species habitat prescriptions to optimize forage and production would benefit fire regimes, when implemented under conditions that mimic natural mean fire intervals and fire regimes.

Reintroduction of special status species may determine when and where mechanical treatments, prescribed burning, and use of multiple objective fires are implemented or allowed.

Existing Condition and Effects Analysis- Juniper Savannah

The natural fire regime is most likely similar to Inter-Mountain Basins Juniper Savannah (Landfire Biophysical Setting 2511150 2008) which has a Landfire Fire Regime Group of III (35 to 200 year frequency and mixed severity) and a mean fire interval of 64 years for all fires. Stand replacement fires in this biophysical setting have an average mean fire interval of 345 years. More open areas in Juniper Savannahs may have a Landfire Fire Regime Group II (0 to 35 year frequency and high surface severity) similar to that listed for Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (Landfire Biophysical Setting 1511210 2007) with an average mean fire interval of eight years and replacement fire interval of 9.5 years.

Alligator Juniper Savannah vegetation type is similar to the description of the Madrean Juniper Savannah (Landfire Biophysical Setting 2511160 2007), which states the fire regime of this ecological system is not known as well, with models placing it in Fire Regime Group III (35 to 200+ year frequency and mixed severity). There are essentially no data about fire frequency, fire history or fire behavior. Fire occurrence was determined primarily by fire occurrence in the surrounding matrix vegetation, and was ignited by lightning during early summer. Average mean fire interval for all fires in Juniper Savannah is 46 years and stand replacement fire intervals are 137 years. Fires are typically low severity (Fire Regime I).

The 2011 Deep fire (287 acres) and the 2012 Aztec fire (134 acres) on Dagger Allotment are the only known large fires over the past forty years to occur in this vegetation type on Dagger and Poison Spring allotments. Fire history records do not provide enough information on fire return interval for the Juniper Savannah vegetation type to determine if reference conditions are being met over the entire landscape.

Portions of Chrysotile Allotment have had hazards fuel work done in the past seven years. In 2004 there was a commercial fuel wood sale of live juniper from 170 acres around Timber Camp. On Sedow Allotment there have been two prescribed fires in the past five years. The Love Prescribed Fire was implemented to manage Lehman's lovegrass and the Sevenmile Prescribed Fire was implemented to reduce brush cover and provide opportunity for more palatable forage species to return and improve the water supply to nearby springs.

Environmental Consequences- Alternative 1 (No Action)

Current fire management techniques would continue; any wildfires within the project area would be managed using the appropriate management response (AMR). Potential for juniper encroachment combined with an increase in grass and shrub understory may allow for an increase in number of lightning caused wildfires as result of reduced soil compaction and trampling of

vegetation by cattle. Fire return interval may move to more desired conditions as wildfires would more resemble fire under natural conditions for this vegetation type's fire regime.

Environmental Consequences- Alternative 2 (Current Management)

Fire activity should remain at its current level due to grazing and soil compaction inhibiting growth of vegetation supportive of carrying wildfire, while disallowing fire return interval to return to historic conditions.

Lack of fine fuels in the form of herbaceous growth would not allow fire to spread naturally, reducing the ability to return area to desired conditions. Fires would continue to be infrequent due to lack of fine fuels, but may be more severe at times due to homogenous canopy and increased woody fuel loading.

Fire Regime Condition Class would remain offset from natural conditions, reducing the potential for frequent, low to moderate intensity fires necessary for restoration of fire adapted ecosystems.

Environmental Consequences - Alternative 3 (Proposed Action)

Effects would be similar to those described for alternative 2 above and also alternative 3, semi-desert grassland.

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

See effects described for alternative 4, semi-desert grassland.

Existing Condition and Effects Analysis - Juniper Woodland

Two vegetation types consisting of six different plant communities makes this grouping difficult to describe both the existing conditions and the desired future conditions. Species composition and stand structure vary by location primarily due to precipitation, elevation, temperature, soil type, and successional phase.

Alligator Juniper Woodland: This vegetation type was historically similar to the alligator juniper savannah, but the density of tree overstory has greatly increased and, in most cases, the herbaceous cover has decreased. The desired conditions of these two types are the same however the means to obtain them are different. In the alligator juniper woodland it would be necessary to reduce the tree overstory in order to obtain desired condition of an open park-like setting.

Pinyon-Juniper Woodland (persistent) is characterized by even-aged patches of pinyon and junipers that at the landscape level form multi-aged woodlands. Very old trees (>300 years old) are present. Tree density and canopy cover are high, shrubs are sparse to moderate, and herbaceous cover is low and discontinuous. Snags and older trees with dead limbs and/or tops are scattered across the landscape. Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances (e.g., insects, diseases, and fire) and climate variability. Insects and disease generally occur at endemic levels.

Pinyon/Juniper/Oak Woodland: A single desired condition description is difficult for this type due to a large amount of natural variability. Some stands have an open aspect with a grassy

understory, while others have a closed canopy with little to no understory. Generally, the goal is to increase the foliar canopy cover, basal cover, and vigor of desirable perennial grasses, forbs, and half-shrubs (listed as “Increaser” and “Decreaser” species) and increase the cover and vigor of shrubs classified as “A” browse species in the same handbook. In some areas devoid of herbaceous vegetation, desired conditions may not be obtainable without seeding. In areas with dense overstories, mechanical thinning may be required.

It may be questioned, if it is desirable or pragmatic to try and increase stocking at all levels. The pure mathematics of space occupancy would infer there is a certain site capacity, when balancing the number of plants at different sizes in different layers. Exceeding optimum stocking would have adverse effects on individual tree health and site resilience. In terms of wildfire, wider spacing among trees, fewer shrubs, and more grass species would lend the site to faster moving, shorter duration, low to moderate intensity fires. The natural fire regimes of Pinyon/Juniper/Oak Woodlands appear to be highly variable depending on the type.

Environmental Consequences - Alternative 1 (No Action)

See consequences described for alternative 1, juniper savannahs.

Environmental Consequences - Alternative 2 (Current Management)

See effects as described for alternative 2, juniper savannahs.

Environmental Consequences - Alternative 3 (Proposed Action)

See effects as described for alternative 3, juniper savannahs.

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

See effects as described for alternative 4 under juniper savannahs.

Existing Condition and Effects Analysis- Turbinella Oak Chaparral

Fires are typically mixed severity with a moderate frequency (Fire Regime III). Some evergreen shrub types exhibit occasional high severity fires (Fire Regime IV). Re-establishing a natural fire regime of Landfire Fire Regime Group IV (35 to 200+ year frequency and replacement with high severity) as listed for Mogollon Chaparral (Landfire Biophysical Setting 2511040, 2008) would still mean stand replacement fire at extreme fire behavior. Average mean fire interval for chaparral is 75 years and many of the stands are at that stage now.

Chaparral vegetation is found mainly on Dagger Allotment along steep slopes below the Sierra Ancha Mountains. During the past forty years, multiple fires have burned through a large portion of this vegetation type with mixed severity, creating a mosaic of age classes across the landscape. Fires included the 1970 Deep fire (450 acres), 1974 Tucker fire (200 acres), 1976 Bull fire (6,250 acres), 2000 Coon Creek fire (9,360 acres), 2005 Hackberry prescribed fire (1,375 acres), and 2010 Zimmerman fire (575 acres).

Environmental Consequences - Alternative 1 (No Action)

All vegetation types and conditions exceed historic levels in relation to their potential for large, high-intensity, stand replacing wildfires, increasing undesirable effects from potential wildfires. Tree crowns have become intermingled, creating a continuous chain of fuel capable of carrying fire from the forest floor into the crowns of the tallest trees. The no-action alternative would allow more chaparral acres to succeed to dense brush fields which are more susceptible to fire.

These brush fields would be so thick that they would not be navigable. Manzanita and turbinella oak would become dense and tall, sometimes over 12 feet in height.

Environmental Consequences - Alternative 2 (Current Management)

Due to a limited amount of tall perennial grasses, timing of grass burning is largely dependent upon the growth and subsequent curing of annual grasses and forbs. Implementation of successful burning is dependent upon spring precipitation to grow these plants, and coordinated grazing management to maintain them on site. The current management alternative is not likely to promote or accelerate vegetative treatments beyond what has occurred sporadically in the past.

Previous work on the Tonto and Prescott national forests has been successful in treating this fuel type. Densities can be altered by brushing and thinning especially in urban interface areas and along project perimeters. Usually, it is not economical to mechanically treat wholesale areas of chaparral. Strategically placed fuel breaks would target the understories of brush and small trees, reducing ladder fuels. Prescribed fire can treat acres containing several fuel models as long as predicted behavior outputs are expected and mitigated. Besides fuels management objectives, prescribed burning would help move vegetation toward a more natural condition by treating dense chaparral.

Environmental Consequences - Alternative 3 (Proposed Action)

See effects as described for alternative 3, juniper woodlands

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

See effects as described for alternative 4 under juniper woodlands.

Existing Condition and Effects Analysis - Ponderosa Pine and Mixed Conifer

Ponderosa pine and mixed-conifer ecosystems are found in upper reaches of Dagger Allotment in the Sierra Ancha Mountains and on taller peaks such as Apache and Timber Camp mountains on the Globe Ranger District. Scattered ponderosa pine and pine/oak sites are mixed with woodlands and chaparral. The mixed conifer is almost exclusively on Pleasant Valley Ranger District in the Sierra Ancha Mountains at the upper most elevations. Most of the mixed conifer and about half of the pine (in the analysis area on this ranger district) is in either the Sierra Ancha Wilderness or the Sierra Ancha Experimental Watershed. The remaining pine on forest system lands is partially accessible by limited historic roads.

These vegetative communities are classified as having a frequent-low severity fire regime (Hann et al. 2003). Research indicates that prior to European settlement, low to moderate intensity surface fires burned across these areas every 2 to 10 years (Kaib et al. 2000). It is also evident that the post settlement (1880) fire frequency declined rapidly in these areas. This deviation from the natural fire regime, for a period of approximately 120 years (1880 to 2000), is considered a relatively high departure from normal conditions (FRCC 3) for this vegetation type.

In 2000, the Coon Creek Fire burned through much of the ponderosa pine-mixed conifer community on Dagger Allotment. This was the only significant fire to occur on this portion of the allotment in the past 40 years. In 2006 the Love Prescribed Burn was done to eliminate hazardous fuels on 2,900 acres. In 2010 the Seven Mile prescribed fire was implemented to eliminate hazardous fuel and reduce threats to ponderosa pine on top of the Apache Mountains (5,000 acres). In 2008 there was a prescribed fire of 2,400 acres done around Timber Camp in ponderosa pine. On-going activity in the Timber Camp area includes a 370 acre cutting block at Carol

Springs with wood going out as commercial firewood. There are also commercial fuel wood cutting blocks on Chrysotile Allotment.

Environmental Consequences - Alternative 1 (No Action)

All vegetation types and conditions exceed historic levels in relation to their potential for large, high-intensity; stand replacing wildfires, increasing the negative effects from potential wildfires. Tree crowns have become intermingled, creating a continuous chain of fuel capable of carrying fire from the forest floor into the crowns of the tallest trees.

Fire scarred areas resulting from wildfires will typically consist of heavy, stand-replacing brush component including turbinella oak and manzanita. A decline in production of beneficial forage, browse and other resources occurs. Surviving trees are more at risk of bark beetle and other insect mortality. No new temporary or permanent openings (mosaic effect) would be created and existing ones would not be maintained.

Results of no action would include major changes in vegetative conditions, increases in live to dead fuel loadings, greater continuity in understory fuel loadings, resulting in an increased potential for a large, high-intensity wildfire. Risk, loss of key ecosystem components is at risk. In addition to the stark, lifeless visual impact of burned vegetation, severe wildfire disorders a forest ecosystem. The timber resource is damaged; small trees and understory vegetation may be destroyed; the nutrient capital is depleted; the litter layer may be removed; microclimate immediately above the soil and in the surface soil is modified; the hydrologic behavior is affected; and the habitat for wildlife may be drastically changed.

Environmental Consequences - Alternative 2 (Current Management)

Scientists have had little information about how prescribed fire and cattle grazing - common practices in many Western ponderosa pine forest- affects plant abundance and reproduction in the forest understory. Fire is a key disturbance agent in the fire-prone mixed conifer and ponderosa pine forests of the southwestern United States. Human activities (i.e., livestock grazing, logging, and fire suppression) have resulted in exclusion of fire from these forests for the past century and fire exclusion has caused changes in forest structure and composition (Kerns 2012).

No changes would maintain vegetation within the project area in its present condition. Live fuel conditions would remain at or decrease in height, density, and flammability. Effects of current management activities may be long lasting and clouded by historical uncertainties. Fuel treatments may reduce risk of severe fire, but frequent and extensive prescribed burning may gradually alter the habitat of wildlife by altering stand size structure and composition.

Environmental Consequences - Alternative 3 (Proposed Action)

See effects as described for alternative 3, Juniper Woodlands

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

See effects as described for alternative 4, juniper woodlands.

Seasonal grazing would allow vegetation to grow during the peak growing season providing ground cover available to conduct prescribed fires. Areas heavily grazed and then protected from grazing have typically regenerated well.

Effects of vegetation management tools:

Grazing to reduce seed propagation of undesirable plants and high-intensity, short duration grazing may limit fire's ability to move through an ecosystem by reducing fine fuels in a project area during grazing. If the treated area is allowed to recover during the growing season, grass stands may improve and allow fire to carry across the surface more efficiently.

Fencing, herding, and salting may indirectly benefit fire by improving utilization patterns and thereby improving grass cover. Range improvements may be undesirably impacted by fire.

Buildup of fuels around fences and other developments may add to fire complexity. Water developments may provide emergency water sources during fire management activities and wet ground associated with water developments can often be an effective control feature.

Prescribed fire can act as a management tool when treating noxious weeds or manipulating vegetation. Occasional burning can encourage some invasive species, while repeat burning may set some undesirable species back. Prescribed fire applied in conjunction with seeding or other control measures, such as herbicide application can benefit native plants. Prescribed fire reduces fuel loading, creates a mosaic pattern of openings, and thins overstocked groups of saplings and poles. It can eventually return areas to their natural fire regimes. Repeat prescribed burning raises the crown height of trees. It can be used to mimic naturally-occurring fire, enhance native plant species, control invasive plants, provide forage and habitat for wildlife, contribute to nutrient cycling, and create diversity in vegetative structure and distribution. Initially habitat quality would be lowered, but over a period of time, as native vegetation becomes established, overall habitat quality would improve. This would only occur if native vegetation is allowed to establish following treatments. Success and benefits depend on placement and design of fire treatments. Fire would be prescribed where it can be applied as a management tool to meet resource objectives. Fuels, as part of a site condition, can be reduced while meeting the broader goals of vegetation management on a landscape basis. Prescribed fire and even wildfires managed for resource objectives can help move the landscape towards desired condition in a timelier manner.

Mechanical treatment may be helpful, when considering prescribed fire in areas where smoke management is a concern or where fuel loading is too heavy for effective burning. Once mechanical treatment is applied, future fire use may be implemented. Maintaining groups of trees, reducing densities in other groups, and making openings would result in a non-contiguous fuel-scape, reduce threat from wildfire, and make for a more resilient ecosystem. Opening the forest floor and canopy would induce herbaceous plant growth and ground cover. Thinning with slash disposal reduces the probability of torching. Crown fires would be reduced. Torching and crowning indices are part of the measures for effectiveness of treatments (proposed actions) against the goals and objectives.

Direct Effects of fuels treatments:

- Prescribed Burning: reduction of fuels, creation of openings, and removal of ladder fuels.
- Thinning overstocked groups of saplings and poles: treatment effects may vary with post-treatment grazing strategy.
- Fuel breaks: protection of improvements and high value resources by creating openings between 40 to 75 percent of the total area. Flame lengths would be reduced.
- Thinning from below: reduction in competition due to lower densities, removal of ladder fuels, and improved composition. Thinning would increase vertical and horizontal diversity in wide spectrum of vegetative types.

- Group Selection Cuts in all size classes: reductions in densities in the pine, mixed-conifer, and pine-oak areas. These cuts would result in an improved distribution of size classes and reduction in total crown bulk density.

Indirect Effects of fuel treatments:

- Prescribed Burning: protection of improvements, creation of defense zones, mosaic landscape. Helps create a more natural appearing landscape pattern of openings. Increases grass cover and foraging habitat.
- Fuel breaks: with maintenance, a long-term safeguard against fire spread. Greatly reduces Torching and Crowning Indices. Even without timely maintenance, re-sprouting is less of a threat due to decreases in fuel loft, density, and foliar mass. Missing a scheduled maintenance may be forgiven, but the risk increases as the hazard builds.
- Thinning from below: areas are stocked by well-spaced, larger-size class trees; reduces flame lengths; lowers Torching Index; maintains defense zones; contributes to vertical diversity in stands. Group Selection Cuts in all size classes: a regulated distribution of size classes to perpetually retain desired stand characteristics; provision for tree regeneration; crowns are separated at least ten feet, lowering the Crowning Index; retention of dead and down woody debris and ground cover.

Cumulative Effects of fuel treatments:

- Prescribed Burning: create diversity in vegetative structure and spatial distribution. Affects stocking (trees per acre) and densities (BA or SDI) in terms of species composition, competition, and crowning potential. Helps restore sites by moving them towards DFC (desired future condition). Fuels, as part of a given site condition can be reduced, while meeting the broader goals of vegetation management on a landscape basis.
- Fuel breaks: long-term protection of high value resources
- Thinning from below: Increased diversity in terms of size, structure, and stocking.
- Group Selection Cuts in all size classes: Returns area to an earlier seral stage where ponderosa pine dominates the canopy class. Maintaining stocking by size class and controlling the density regime by Stand Density Index. Creates better distribution of healthier trees in different size classes, making stands more resistant to insect, disease, and wildfire. Creates openings, provide spatial relief and foraging areas. Return to near-natural Condition Classes with fire recurring at intervals normal for vegetation types' Fire Regime. Significant reduction in potential loss due to 'fire kill' mortality of a wildfire. Mortality would be similar to that of a prescribed fire, estimated at 10 to 30percent, rather than the 80 to 100 percent range without treatment.

Wildlife and Fisheries

Desired Conditions

The project area represents an incredible regional resource for plant and animal biodiversity. Large tracts of semi-desert grassland, Sonoran Desert, pinyon juniper woodlands, and unique habitat types support a diversity of wildlife. The intent of desired future conditions is to restore all habitats to natural processes (fire, drought, flooding, etc.), which would maintain, improve, and in some cases, expand present habitat types. Continued health of the project area is dependent upon protection and management of lands that buffer and influence the interior composition. Long-term management objectives must include:

- Maintainance of existing riparian and aquatic habitat and exploration of opportunities to enhance these habitats.
- Cooperation with partners to protect aquatic resources that exist within and surrounding the project area.
- Establishment of a protected wildlife corridor within Salt River and Sierra Ancha wilderness.
- Restore ecological health to a natural diversity of species, including habitats, and forest age classes.
- Protect sensitive and rare ecosystems and species.
- Maintain soil productivity and water quality.
- Reintroduce plants and animals as some may have been lost due to past management actions, influences of non-native invasive species, or other climatic or environmental factors.
- Restore connectivity between metapopulations to provide for genetic diversity.

These actions are critical for continued health of the flora and fauna that depend upon habitats and natural resources found in the project area. The preservation of this great place is dependent upon strong partnerships that evaluate how decisions that are made today influence the ecosystem health and integrity of the forest tomorrow.

Region 3 is currently on a pilot program for Integrated Resource Restoration. A vegetative management approach is an efficient way to integrate this type of restoration given there are two wilderness areas (Sierra Ancha and Salt River) that have threatened plants and animal species, and would benefit from a watershed restoration approach. We have a rare opportunity to put the resource before other management activities. The Integrated Resource Restoration Program aligns with U.S. Forest Service's vision for an integrated approach to maintaining or restoring the ecological integrity of terrestrial and aquatic ecosystems and watersheds necessary to manage National Forest System lands so that they are ecologically sustainable (U.S. Forest Service 2012).

We must learn to husband the spectacularly diverse lands and living things that we have responsibility for. The best way to preserve the open spaces, arid ecosystems, and diverse biota of the Southwest is to keep rural people on the land. Livestock ranching must be both ecologically sustainable and economically viable. Ranching in most areas of the West is economically dependent on seasonal grazing on public lands, and it is in the interest of all parties-rancher, government manager, and public- that these lands be managed so that degradation is halted and damaged ecosystems are restored. Wise pastoral stewardship will go a long way toward maintaining biodiversity and ecological integrity on both private and public rangelands, but other conservation activities will also be required (Brown and McDonald 1995).

Ecological Goals

Ecological goals are the foundation of ecosystem management. These goals are accomplished through management strategies achieved through project actions. Associated with each action is a management strategy identified to be critical to achieving desired conditions. These strategies would be accomplished through projects. Ecological goals benefitting wildlife in the project area are as follows:

- Protect air and water quality.

- A forest with structural complexity: vertically (canopy, mid-story and understory, snags and downed wood) and landscape-scale (mosaic of habitat types, and structure clumps, groups, interspaces and openings).
- Floristic native biodiversity with increased habitat opportunities for target wildlife species and avian, terrestrial, and aquatic native wildlife.
- Intact native plant and animal communities with minimal disturbance from non-native species and invasive species populations controlled through management.
- Reduction of risks to catastrophic events (such as fire and floods) and climate change.
- Expand cover and diversity of native vegetation; manage for age class heterogeneity, a mosaic of vegetative communities, increased water flow and increased structural complexity.
- Improve habitat quality for wildlife by maintaining and enhancing availability of forage, cover, and water and habitat connectivity.
- Reduce undesirable impacts to wildlife from manmade infrastructure such as water developments, fencing, and roads by adopting best management practices and design features that reduce direct and indirect effects.

The most advantageous desired future condition for wildlife habitat is to maintain or enhance an ecologically diverse landscape with a mosaic of vegetative seral stages and minimal habitat fragmentation; where plant and animal communities thrive and reproduce whilst maintaining genetic diversity between metapopulations. Diverse and connected landscapes afford wildlife populations the flexibility to respond to natural processes, such as drought, fire, and climate change and contribute to population resilience in the facing of changing conditions.

Species Specific Desired Conditions

Mule Deer:

- Improve mule deer nutrition
 - Increase forage plant species diversity, density, distribution
 - Develop habitat management objective for key forage species: cliffrose (*Purshia spp.*), mountain mahogany, jojoba, turbinella oak, desert ceanothus, buckwheat, false mesquite, spurge (*Euphorbia spp.*), deer vetch (*Lotus spp.*), ratany, skunk bush sumac, holly-leaf buckthorn, mesquite beans, and seasonal forbs).
 - Encourage mast production and browse (maintain a residual of 50 percent of browse leaders).
- Improve habitat function; balance forage and cover requirements
 - Create and manage for mosaics of uneven age in shrub communities with < 40 percent canopy cover.
 - Maintain security cover in forest restoration plans (this relates to shrub/small diameter tree understory and clumping of large trees).
 - Prevent habitat type conversions.
 - Promote natural fire regimes.
 - Prevent/reduce invasive plant distribution and abundance.
 - Optimize water distribution and availability (0.5 to 1.5 mile buffers between waters depending on habitat type; optimum spacing is 1 mile).
 - Mitigate roads/recreation, grazing impacts on important fawning grounds - develop special management measures during fawning season (late June to early August).

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- Maintain residual vegetation for cover and forage (stubble height guidelines - see Holechek and Galt 2000).
- Manage timber to improve habitat mosaics and uneven age of understory & mast production.
- Utilize wildlife friendly fence designs on all rangeland fences and water developments.
- Conserve habitat linkages.
- Maintain riparian, xeroriparian and spring habitats - riparian guidelines for woody plant recruitment and maintenance; residual stubble heights or utilization guidelines for herbaceous species to maintain where cattle aren't excluded; protect water quality and quantity.

Coues White-tailed Deer:

- Maintain fawn hiding cover
 - >25 cm on ridges and in small drainage areas with grass cover.
- Increase water distribution and abundance
 - Locate water developments in drainages away from bed sites.
 - Avoid fencing.
 - Optimum 1.2 km buffer between waters.
 - Higher water source density in female use areas (north facing steep slopes).
- Create disturbances to mature habitats to enhance habitat diversity and forage availability
 - Maintain shrub/tree cover on >20 percent slopes with northern exposures (females highly select these areas during summer fawning season) and maintain more open contiguous habitat on south and east facing slopes for browse/mast production as important seasonal fall/winter foraging areas.
 - Create numerous small openings of <25 ha (1 hectare is optimum; widths <100 meters and or irregular shapes) to increase habitat diversity.
 - Avoid clear-cutting or extensive brush crushing on slopes >20 percent.
 - Enhance shrub and forb diversity, abundance and browse through uneven or selective cutting, thinning, mechanical, and prescribed fire treatment to create mosaics within dense tree/shrub stands.

Mearn's Quail:

- Maintain or improve security and thermal cover
 - High association with perennial bunch grasses - maintain grass cover at 51 to 75 percent in pine/oak/woodland/grassland associations
 - Maintain thermal cover (tree canopy cover) at >25 percent
 - Limit fuel wood cutting in Mearns' quail habitat to maintain minimum tree canopy cover >25 percent; tree removal to lower canopy cover below 75 percent would be beneficial (greatest selection for 26 to 50 percent tree canopy cover)
 - Maintain a mosaic of residual vegetation (grass) heights between 50 to 20 cm minimum (optimum for visual obstruction and predator avoidance)
- Maintain or improve forage diversity and abundance
 - Species richness at \geq 5 grass species and high forb richness (areas with higher diversity and density is believed to promote higher insect production important forage for young chicks; quail select for areas with higher forb richness - believed a function of dietary requirements)
 - Oak trees and their mast are seasonally important forage

Turkey:

- Maintain or improve winter foraging habitat
 - Promote mast production for winter foraging areas - protect and increase mature mast producing species such as Gambel oak, alligator juniper and pinyon trees at >90 basal area (BA) (all trees within stand) and habitats <1 mile from known or potential roost trees should be favored for management
 - Maintain minimum total BA of 85 ft²/ac
 - Openings should not exceed 0.15 ac or occur at densities >1/acre. Pinyon-juniper habitat should not have openings exceed >0.06ac at densities >2/acre.
 - Maintain roost sites; especially winter roosts typically of >30 mature pine trees (mean diameter 25 inches and mean BA 90 ft²/ac clumped together
 - Protect a minimum of 2 known roost sites per mile and 6 potential roost sites per mile
- Maintain or improve roosting habitats
 - Retain old-growth pine especially on steep slopes (>30 percent)
 - Protect all known roost sites from removal
 - Buffer roost sites by a minimum of 1 mile from forest restoration treatments
- Maintain or improve nest habitat (prefer slopes >30 percent with moderate to high conifer/pine trees and high densities of shrub and deciduous trees; clumped understory/overstory and patchy forest canopies)
 - Avoid timber treatments on slopes >30 percent
 - Preserve hiding cover in forest stands with >= 50 percent canopy cover and moderate-high basal areas (>70 to 90 ft²/ac) in small (1 to 4 acre) patches to retain nest site characteristics on slopes >30 percent
 - Scatter logging slash versus leaving in piles in nesting areas
 - Maintain short (<70 ft) horizontal visibility distances (distance at which a turkey silhouette is obscured) in nesting areas
 - Retain high herbaceous cover (>30 percent ground cover) and tall residual stubble heights
 - Avoid vegetation management activities during nesting season to minimize disturbance and/or nest abandonment
- Maintain or improve loafing and feeding/brood habitat; loafing areas are typically near feeding areas and have low visibility; the combination of natural openings/cover, high forb species richness, high percent grass cover, tall herbaceous vegetation on gentle slopes generally characterize feeding sites.
 - Loafing habitat - maintain dense clumps (<0.25 hectare) of small trees (pole/sapling 15 to 25cm dbh) with >50 percent canopy closure; in locations such as canyons or draws, canyon rims, and ridge tops adjacent to feeding areas
 - Leave large downed logs or logging culls in loafing areas
 - Create or maintain small openings in timber stands to maximize food/cover combinations
 - Maintain feeding habitat within <1.6 km to roosting habitat

Tassel-eared Squirrels:

- Maintain stand-scale habitat characteristics that support average or above average recruitment. Consider landscape-scale habitat relationships in addition to stand-scale habitat needs.
 - Canopy clumpiness and interlocking canopies
 - Areas with high tree basal areas

- Maintaining large VSS5 and VSS6 trees where they occur

American Black Bear:

- Benefit from mast production and require less horizontal cover and rely heavily on the shrub communities. *Black Bear Habitat Use in Northern AZ* (Mollohan 1987) says:
 - Avoid construction of roads along canyon walls and drainage bottoms
 - Preserve Gambel oak stands (canyon walls/bottoms emphasized) and connectivity between
 - Preserve and protect mixed conifer-maple associations
 - Retain mixed conifer pockets in stands of >50 acres and do not log at all if stand is <100 acres; stack but do not burn slash
 - Avoid logging drainages and leave 100 yard buffer on each side if slopes are <30
 - If logging in bear habitat openings should not make up more than 25 percent of a given area over time; small interconnected openings of not >1 acre are optimum
 - 80/20 cover/forage ratio in bear habitat areas; cover in areas of >30 percent slope and horizontal cover <60 ft; forage areas of <30 percent slope horizontal cover <80 ft
 - In pinyon-juniper habitat avoid cutting juniper within 100 yds of drainages or interconnecting travelways. In other areas retain junipers >12 in dbh with >25 percent living crown and retain 40 percent of trees <12 in dbh

Wildlife Desired Conditions from the Forest Plan

General wildlife resource goals for the Tonto National Forest are outlined in the Forest Plan and include providing for species diversity, maintaining viable populations of existing species, improving habitat for selected species, and managing to increase population levels of threatened and endangered species.

- Provide conditions encouraging optimum establishment and re-establishment (following floods and fires) of riparian habitats along the upper Salt River and its tributaries.
 - Key riparian wildlife habitat attributes include multi-storied stands of native riparian vegetation including dense, multi-storied stands with tall trees (>20 ft), and substantial mid-story and understory habitat layers.
- Maintain a minimum of 30 percent effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30 percent exists, it will be the management goal to obtain a minimum of 30 percent effective ground cover.
 - Manage the desert scrub type to emphasize production of javelina, Gambel's quail, and mule deer.
 - Manage higher ecosystem extensions in the desert scrub type to emphasize cottontail production.
 - Manage the chaparral type to emphasize the production of whitetail deer.
 - In the pinyon-juniper type, manage toward a goal of 25 to 50 percent cover of browse shrubs in key deer areas.
 - In the pinyon-juniper type manage toward a goal of 25 to 50 percent cover of browse shrubs in key deer wintering areas.
 - In the pinyon-juniper type, manage toward a goal of 25 to 50 percent cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore a seed source.
 - Manage the pinyon-juniper type to emphasize the production of mule deer.

- Manage the pinyon-juniper type to emphasize the production of whitetail deer.
- Coordinate with Tonto Basin and Globe ranger districts staff (Range) to achieve utilization in the riparian areas that will not exceed 20 percent of the current annual growth by volume of woody species.
 - Coordinate with Range to achieve at least 80 percent of the potential riparian overstory crown coverage.
 - Coordinate with Range to achieve at least 50 percent of the cottonwood-willow and mixed broadleaf acres in structural Type 1 (by 2030).
 - Rehabilitate at least 80 percent of the potential shrub cover in riparian areas through the use of appropriate grazing systems and methods.
 - Forage use by grazing ungulates will be maintained at or above a condition, which ensures recovery and continued existence of threatened and endangered species.
- Allow for forage to maximize threatened and endangered species, management indicator species, and emphasis harvest species.
- Identify, survey, map, and analyze habitat for all federally-listed species. ***Identify management conflicts and enhancement opportunities. Correct any management conflicts or problems.***
 - Manage Mexican spotted owl (MSO) and Northern goshawk habitats within the project area according to standards and guidelines in the Forest Plan (Replacement pages 40-1 through 40-13).
 - Manage Southwestern willow flycatcher, MSO, Chiricahua leopard frog, and bald eagle using appropriate recommendations and conservation measures from their species recovery plans.
 - Protect and enhance Yuma clapper rail habitat. Identify, document, and correct management conflicts with, or other disturbances to, Yuma clapper rail or their habitat.
 - Rehabilitate bald eagle nesting habitat by improving riparian habitat on alluvial benches.
 - Survey, study and assess the status of candidate species on a priority basis. Identify, document and correct any management conflicts to the species or their habitats.
 - Survey, study, and assess the status of desert tortoise habitat on the forest. ***Identify, document, and correct any management conflicts with tortoises or their habitat.***
- Retain all raptor nest tree groups.
- Inventory fuel wood on the area every 10 years.
- Manage the pinyon-juniper type in a sustained yield even flow basis. Horizontal diversity will be provided by a mix of successional stages within 5,000 acre wildlife management units. Ten percent of the type will be maintained as permanent openings with suitable ground cover for specific site conditions. Power line corridors, natural openings, or meadows count toward the standard. Where natural openings or power line corridors do not meet this standard, openings will be created. The scheduling of fuel wood harvest will produce a distribution of successional stages as follows:
 - Permanent Openings (2 to 40 acres) 10 percent
 - Fresh cut areas (0 to 20 years) 10 percent
 - Immature (20 to 100 years and 3-6 in. dbh) 40 percent
 - Mature (100 to 175+ years and 6-11 in. dbh) 40 percent
- The following cover standards and guidelines will apply in areas where threatened, endangered, and sensitive species habitat requirements do not conflict:

- Provide a ratio of 60:40 percent forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas.
- Design the fuel wood harvest blocks in the woodland type in irregular shapes less than 40 acres and less than 600 feet across.
- Achieve a savannah condition in the pinyon-juniper type by leaving a minimum of 40 mature trees per 40 acre block.
- The silvicultural prescription is even-aged management under the shelter wood method with pinyon uncut and 40 large juniper trees left per 40 acre cut block.
- Maintain a minimum of 100 snags per 100 acres. A preferred snag is 12 inches dbh and 20 feet tall over at least 50 percent of the pinyon-juniper type.
- Provide a ratio of 60 percent: 40 percent forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas.
- The oak component of the conifer types and the encinal oak type will be maintained. Oak may be cut to improve spacing and sprouting. Thickets can be cut to thin but retain at least 40 percent of the stand. When thinning stands retain large trees contributing the bulk of the mast crop. Manage oak to enhance band-tailed pigeon and whitetail deer habitat, especially within one-half mile of water.
- Maintain pine stringers in good habitat condition as prime areas for turkey roosting. No roads should be built through or adjacent. If necessary, cross stringers at an obtuse angle.
- Install wildlife escape ramps in all livestock water, as funding permits.
- Use of approved herbicides on a selective basis where brush encroachment is clearly inhibiting forage production for wildlife and domestic livestock. Possible treatment areas would be identified in allotment management plans and would involve areas of limited size and extent where other management practices (i.e., prescribed burning) cannot be effectively or economically utilized to achieve management objectives. Projects of this nature would be subject to environmental assessment and public involvement to ensure project objectivity and public safety.
- Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement.
 - Integrate habitat needs through prescribed fires within fire suppression objectives.
 - Manage the chaparral type on a 30-year prescribed fire rotation on those sites managed intensively for forage production and water yield (U.S. Forest Service 1985).
- Wildlife habitat improvement needs will be integrated into range forage improvement projects identified in approved AMP. Habitat improvement opportunities will also be integrated with timber management activities.
- Conduct surveys and write reports on allotments scheduled for re-analysis and possible stocking adjustments. Allow for forage to maximize Threatened and Endangered (T&E) species, management indicator species, and emphasis harvest species.

Management Area 6F

Tonto Basin Ranger District – Roosevelt and Apache Lakes Recreation Area

- Identify and delineate the breeding home range of all peregrine falcon nesting territories. Document and correct disturbances to peregrine falcons and their habitat.

- Continue periodic inspections and maintenance of existing wildlife exclosures and restoration projects. Develop reports as needed to describe results of studies. Improve the level of protection and maintenance of these sites to ensure their continued informational value for wildlife management.
- Manage the desert scrub type to emphasize production of javelina and Gambel's quail.
- Manage the higher ecosystem extensions in the desert scrub type to emphasize cottontail production.
- Rehabilitate bald eagle nesting habitat by improving riparian habitat on alluvial benches.

Management Area 6G

Tonto Basin Ranger District – Salt River Canyon Wilderness

Management Emphasis: The primary emphasis for this area is the preservation of naturally occurring flora and fauna, esthetics and ecological processes while providing a very high quality white-water river-running experience. Special consideration will be given to meeting bald eagle home range requirements. Watershed protection is also an important emphasis, and the stream shall be maintained in a free-flowing condition with water quality maintained or improved. Other activities that are authorized by the *Wilderness Act* will be conducted as so to minimize their impact on wilderness character.

- Locate and analyze peregrine falcon habitat. Document and correct disturbance to peregrine falcons and their habitat.

Management Area 6J

Tonto Basin Ranger District – General Management Area

Management Emphasis: Manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by FSM 2526) to benefit riparian dependent resources.

- Manage the desert scrub type to emphasize production of javelina, Gambel's quail, and mule deer.
- Manage higher ecosystem extensions in the desert scrub type to emphasize cottontail production.
- In the pinyon-juniper type, manage toward a goal of 25 to 50 percent cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore a seed source.
- Manage the pinyon-juniper type to emphasize the production of mule deer.
- Manage the chaparral type to emphasize the production of whitetail deer.
- Continue periodic inspections and maintenance of existing wildlife exclosures and restoration projects. Develop report as needed to describe results of studies. Improve the level of protection and maintenance at these sites to ensure their continued informational value for wildlife management.
- Locate and analyze peregrine falcon habitat. Document and correct disturbances to peregrine falcons and their habitat.
- Integrate habitat needs through prescribed fires within fire suppression objectives.

- Provide a ratio of 60:40 percent forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas.
- In the pinyon-juniper type manage toward a goal of 25 to 50 percent cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore a seed source.
- Achieve a savannah condition in the pinyon-juniper type by leaving a minimum of 40 mature trees per 40 acre cut block.
- Maintain a minimum of 100 snags per 100 acres. A preferred snag is 12 ft. dbh and 20 feet tall over at least 50 percent of the pinyon-juniper type.
- Brush disposal will be consistent with wildlife objectives.
- Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement, except in riparian areas.

Management Area 2B

Globe Ranger District – Salt River Canyon Wilderness

Management Emphasis: The primary emphasis for this area is the preservation of naturally occurring flora, fauna, aesthetics and ecological processes while providing a very high quality white water river running experience. Special consideration will be given to nesting bald eagle home range requirements. Watershed protection is also an important emphasis, and the stream shall be maintained in a free flowing condition with water quality maintained or improved. Other activities that are authorized by the *Wilderness Act* will be conducted so as to minimize their impact on wilderness character.

- No non-indigenous species of animal not now found in this wilderness will be introduced or utilized within it.
- Locate and analyze peregrine falcon habitat. Document and correct disturbances to peregrine falcons and their habitat.

Management Area 2C

Globe Ranger District – Upper Salt River

Management Emphasis: The primary emphasis for this area is the preservation of naturally occurring flora and fauna, and esthetic values while providing a very high quality white-water river-running experience. Special consideration will be given to nesting bald eagle home range requirements. Watershed protection is also an important emphasis, and the stream shall be maintained in a free-flowing condition with water quality maintained or improved. Other activities will be authorized so long as they are consistent with primary management emphasis for this river and its adjacent lands.

- Rehabilitate bald eagle nesting habitat by improving riparian habitat on alluvial benches.
- Assist Arizona Game and Fish Department in stocking Colorado pikeminnow in the Salt River and monitoring for success.
- Locate and analyze peregrine falcon habitat. Document and correct disturbances to peregrine falcons and their habitat.

Management Area 2F

Globe Ranger District – General Management Area

Management Emphasis: Manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, water quality maintenance, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by FSM 2526) to benefit riparian dependent resources.

- Manage the desert scrub type to emphasize production of javelina, Gambel's quail, and mule deer.
- Manage higher ecosystem extensions in the desert scrub type to emphasize cottontail production.
- In the pinyon-juniper type manage toward a goal of 25 to 50 percent cover of browse shrubs in key deer wintering areas. Planting may be necessary in some areas to restore a seed source.
- Study and assess the effects of grazing on the endangered Arizona hedgehog cactus by fencing plots. Correct management conflicts within the range of Arizona hedgehog cactus.
- Manage the pinyon-juniper type to emphasize the production of mule deer.
- Manage the chaparral type to emphasize the production of whitetail deer.
- Continue periodic inspection and maintenance of existing wildlife exclosures and restoration projects. Develop reports as needed to describe results of studies. Improve the level of protection and maintenance at these sites to ensure their continued informational value for wildlife management.
- Locate and analyze peregrine falcon habitat. Document and correct disturbances to peregrine falcons and their habitat.
- Integrate habitat needs through prescribed fires within fire suppression objectives.
- The following cover standards and guidelines will apply in areas where threatened, endangered, and sensitive species habitat requirements do not conflict:
 - Provide a ratio of 60 percent: 40 percent forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing area.
 - Design the fuel wood harvest blocks in the woodland type in irregular shapes less than 40 acres and less than 600 feet across.
 - In the pinyon-juniper type, manage toward a goal of 25 to 50 percent cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore a seed source.
 - Achieve a savannah condition in the pinyon-juniper type by leaving a minimum of 40 mature trees per 40 acre block.
 - Maintain a minimum of 100 snags per 100 acres. A preferred snag is 12 in. dbh and 20 feet tall over at least 50 percent of the pinyon-juniper type.
- Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement.

Management Area 5A

Pleasant Valley Ranger District – Sierra Ancha Wilderness

Management Emphasis: Manage for wilderness values while providing livestock grazing and recreation opportunities that are compatible with maintaining wilderness values and protecting resources.

- Locate and analyze peregrine falcon habitat. Document and correct disturbances to peregrine falcons and their habitat.

Management Area 5D

Pleasant Valley Ranger District – Mogollon Rim-Sierra Ancha Area

- Achieve water distribution by augmenting natural with constructed up to a minimum of 1 water per section. The optimum for small game is four waters per section.
- Plan a minimum of one slash pile or unlopped top per acre within one-half mile of water for turkey nesting cover.
- In deer fawning and elk calving areas provide hiding cover in five acre patches scattered over 10 percent of the area.
- Maintain pine stringers in good habitat condition as prime areas for turkey roosting. No roads should be built through or adjacent. If necessary, cross stringers at an obtuse angle.
- Aspen stands should be periodically harvested to achieve wildlife benefits. A 20-year rotation retaining some old growth has been proposed.
- The oak component of the conifer types and the encinal oak type will be maintained. Oak may be cut to improve spacing and sprouting. Thickets can be cut to thin but retain at least 40 percent of the stand. When thinning stands retain large trees contributing the bulk of the mast crop. Manage oak to enhance band-tailed pigeon and whitetail deer habitat, especially within one-half mile of water.
- Retain all raptor nest tree groups.
- Continue monitoring wildlife exclosures and restoration projects. Develop reports as needed to describe results of studies. Improve the level of protection and maintenance at these sites to ensure their continued informational value for wildlife management.
- Locate and analyze peregrine falcon habitat. Document and correct disturbances to peregrine falcons and their habitat.
- Wildlife habitat improvement needs will be integrated into range forage improvement projects identified in approved allotment management plan. Habitat improvement opportunities will also be integrated with timber management activities.
- Maintain a minimum average of four roosts per section on turkey winter range, averaging 20 usable trees and at least 80 basal area. Usable trees are open crowned with large horizontal branches at least 18 inches dbh, more than 50 feet tall.
- Maintain a minimum average of two roosts per section on turkey summer range, averaging 8 to 12 usable trees and at least 80 basal areas. Plan a minimum of one slash pile or un-lopped top per acre within one-half mile of water for turkey nesting cover.
- Provide openings (2 to 40 acres in size) on 8 percent of the tentative suitable ponderosa pine/mixed conifer type. Create openings where necessary in the 5,000 acre management units to achieve 8 percent. Power line corridors, natural openings or meadows qualify as openings.
- Artificially generate habitat diversity requirements for wildlife within the suitable portion of the 5,000 acre management unit.

- Manage noncommercial species within the pine type to maintain their representation in the vegetative diversity.
- Manage the oak component to maximize an optimum mix of mast and browse to accomplish wildlife objectives.

Recommended actions for habitat improvement:

Grazing systems can be used to minimize livestock grazing impacts on wild ungulates and other wildlife. In some cases, livestock grazing can be used to improve wild ungulate habitat (Holechek et al. 1984). Growing seasons on the allotments tend to be bimodal. Managers and livestock permittees can manage for droughts by reducing stocking rates, keeping stocking rates at levels that would maintain forage/cover during drought and non-drought periods, or de-stocking to maintain organic litter for subsequent plant recovery. The Tonto Drought Policy would assist resource managers to minimize impacts to resources from livestock grazing during drought. Litter encourages plant recovery after drought because it traps seeds and lowers evaporative loss (Milchunas 2006). The seeds and subsequent plants provide wildlife with food, nesting sites, and cover. Rainfall amounts on the allotment vary and are unpredictable within and among years.

- Follow the Forest Plan
- Use of prescribed/managed fire to increase diversity of plant species, stop invasion of woody plants into semi desert grasslands, and to create foraging holes within the pinyon juniper woodlands.
- Create fire cycle that mimics fire regime for each vegetation community
- No grazing within the Sonoran Desert and riparian habitat
- Water lots would be good to establish, so cattle can use creeks for water.
- No new or further development of springs/seeps to allow riparian vegetation to recover and for wildlife to have first access to natural waters.
- Instead of developing springs consider drilling wells or creating earthen stock tanks as that water is from a separate source.
- Protect Edward Spring, Knowles Hole Spring, and consider sensitive species reintroduction.
- Reduce cattle to numbers that would be the greatest benefit to wildlife by increasing forage and cover.
- Consider nonuse for all allotments during times of drought (moderate to severe) to allow forage and cover to maintain current condition.
- Only graze the number of cattle that can be supported for a moderate drought to allow habitat quality to remain stable during times of drought and improve when precipitation amounts are better than average.
- Consider seasonal grazing as a viable option. Grazing strategy from November to May would benefit overall habitat quality in all vegetation types except semi-desert grasslands.
- Precipitation and timing influence growth of annuals and perennials. This factor needs to be taken into account for adaptive management and use of pastures.
- Management for game and non-game species using species specific prescriptions.
- Make Sierra Ancha and Salt River Wilderness Areas non-use for the benefit of threatened and endangered species, and sensitive plants.

Existing Condition and Effects Analysis - Sonoran Desert

In 2010, a national effort was launched to assess the condition of all 6th code watersheds on National Forest land. Twelve attributes were assessed. Attributes that may be affected by this

project are: Water Quality, Water Quantity Condition, Aquatic Habitat Condition, Aquatic Biota Condition, Riparian/Wetland Vegetation Condition, Soil Condition, Fire Effects and Regime, Forest Cover, Rangeland, and Terrestrial Invasive Species. The results of the assessment for the 6th code watersheds in the project area are listed in appendix F.

Table 8: Plant and Animal Species of Concern

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
Lesser Long-nosed Bat	Arizona Toad	Black-throated Sparrow	Bendire's Thrasher	Javelina	Olive-sided Flycatcher
Morafka's Desert Tortoise (C)	Lowland Leopard Frog	Canyon Towhee	Gila Woodpecker	Mule Deer	Sage Thrasher
	Western Red Bat		Phainopepla	Mourning Dove	Red-naped Sapsucker
	Desert Bighorn Sheep		Canyon Towhee	White-winged Dove	
	Rocky Mountain Bighorn Sheep		Gilded Flicker	Gambel's Quail	
	White-nosed Coati		Prairie Falcon	Mountain Lion	
	Reticulate Gila Monster		Costa's Hummingbird	Bobcat	
	Abert's Towhee		Golden Eagle		
	Zone-tailed Hawk		Purple Martin		
	Tonto Basin Agave		Elf Owl		
	Hohokam Agave		Peregrine Falcon		
	Peregrine Falcon		Bell's Vireo		
			Lucy's Warbler		
			Yellow Warbler		
			Northern Beardless Tyrannulet		

Federally Listed Species

There is potential habitat for the lesser long-nosed bat and the Morafka's desert tortoise in the analysis area. There are no records of either species. This is probably more of a foraging area for the lesser long-nosed bat.

Forest Sensitive Species

Little is known about the populations of sensitive species in the analysis area. They have all been observed within the analysis area.

Bald and Golden Eagles

Both species occur within the project area and can be expected to forage opportunistically within Sonoran Desert vegetation. Bald eagles forage most frequently at major water sources including lakes and streams. There are few suitable water sources for foraging. Golden eagles forage over large areas of open habitats on a variety of animals including juvenile deer and javelina.

Game Species (Harvest Emphasis Species)

Mourning dove, white-winged dove, Gambel's quail, javelina, and mule deer are all showing ten year declines in the analysis area (Sayer and Rodriguez 2012). All other game species are showing stable population trends. Bighorn sheep reside primarily along the Salt River corridor in the Sonoran vegetation type. Currently there is no hunt offered in the game management units in the analysis area. Sheep numbers are too low to offer a hunt.

Water Resources

Water is limited within the analysis area. There are some springs, stock tanks, and Roosevelt Lake. Cherry Creek, Coon Creek, Pinal Creek, and the Salt River flow through this area.

Summary

Habitat quality is in poor condition throughout the analysis area due to historical use by cattle and recreation activities. Reviewing LANDFIRE maps from the area show there is uncharacteristic native vegetation over 75 percent of the vegetation type, because it is out of its natural fire regime and seral stage. There is abundance of invasive weeds (red brome) that are changing the fire regime and making cacti (mainly saguaro) vulnerable to fire. There is reduced plant diversity within this vegetation type.

Environmental Consequences- General Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat

Direct Effects: managed livestock grazing can have these general direct impacts on wildlife and habitat quality:

- Removal of vegetation through management activities such as herding, fencing, branding activities, bedding, congregation at water developments and salting grounds
- Reduce and/or increase vegetative growth and litter cover. Livestock can be managed to remove non-native plants to maintain integrity of wildlife habitat.
- Selectively affecting plant species that are palatable
- Introduction and dispersal of non-native plants
- Direct accidental mortality/injury of wildlife species through trampling
- Predator and rodent control
- Reduction of targeted non-native species (i.e., red brome)

- Reduction of competitors (native grazers and browsers)
- Localized soil compaction at new and existing water developments, salting grounds, and holding pastures
- Dispersion of cattle throughout pastures with development of new waters

Feeding on plants by various herbivores, especially livestock and big game but also by rodents, lagomorphs, insects and even some birds and reptiles, may alter vegetative communities as habitat for birds. Species composition of plants, density of stands, vigor, seed and insect production, and growth form of plants often change due to grazing. Removal of vegetative cover as well as trampling may expose soils to increased wind and water erosion.

Grazing may also affect vegetation communities by selectively impacting plant species that are palatable to livestock or those species that are less able to withstand grazing. Often these are the same species palatable to wildlife browsers such as deer. Riparian plants are especially palatable. Riparian areas provide water, forage, and cover to wildlife associated with adjacent upland communities, including livestock, as well as riparian obligate species for all or part of their life cycles.

Upland areas and associated habitats are directly affected by grazing and associated activities through livestock consuming plants, bedding, congregating at water developments, herding, off-loading livestock, and branding activities. Upland vegetation density and composition are reduced if livestock grazing and associated activities are not managed to reduce or minimize such affects.

Livestock grazing can directly affect fisheries and wildlife by altering riparian and upland soils and vegetation composition, density and structure, water quality, quantity, temperature and flow patterns, shape and form of the stream channel, and aquatic and terrestrial faunal assemblage composition (Belsky et al. 1999).

Predator and rodent control, reduction of competitors, and accidental mortality are direct effects suffered due to livestock production. Classic examples are the wolf, prairie dog, and desert tortoise and, indirectly, black-footed ferret, willow flycatcher, and the California condor (Krausman 1996). Within the analysis area predators that are controlled for livestock grazing are the mountain lion and coyote.

Indirect Effects

- Managed livestock grazing can have these general indirect impacts on wildlife and habitat quality:
- Alter the composition of the plant community,
- Increase the productivity of selected species,
- Alter the natural fire regime.
- Increase impacts from natural processes (drought, floods, fire, etc.)
- Decline in wildlife and plant species diversity
- Avoidance by wildlife
- Trophic linkage, disease and internal parasitism, external parasitism, and chemical contamination.
- Decreased water filtration impacting watershed health

- Reduction of soil organic matter and soil moisture
- Increase in particulate generation, and significant changes in biogeochemical cycles
- Dispersion of cattle throughout pastures with new water developments.

Riparian overstory is often reduced by livestock grazing (Kauffman and Kruger 1984), and this stratum provides cover and nesting habitat for many vertebrates and affects water temperature for aquatic organisms. Streamside vegetation influences bank and channel morphology via altering flow velocities, reducing down-cutting during flood conditions, and holding erosion inputs from uplands.

Riparian and upland areas provide important terrestrial and aquatic habitat to wildlife species. Congregation of livestock (herding, stock tank areas, trailering, loading/unloading, maintenance of livestock facilities, branding) have direct effects to wildlife or associated habitat when considering all grazing alternatives. Effects may include removal of vegetation, dust accumulation, noise, avoidance of areas by wildlife, and localized soil compaction. For the most part, effects associated with congregation of livestock are primarily within riparian key reaches, developed waters, and salting areas.

Excessive grazing and trampling impacts destabilize and break down stream banks which results in negative effects to aquatic wildlife. These effects may be realized through modification of stream morphology and function, increased siltation, increased water temperatures, and reduction of woody and herbaceous vegetation. During scouring floods fish populations are more vulnerable to removal without stable banks and associated vegetation in place.

Deterioration of the ecosystem can result in a significant decline of species diversity, loss of vegetative cover, reduction of soil organic matter and soil moisture, increase in particulate generation, and significant changes in biogeochemical cycles. Vegetation contributes organic matter to the soil which affects albedo, adds insulation, and increases water holding capacity and infiltration (Balling et al. 1998). Historically, compacted soils in the uplands have caused lower rates of water infiltration and result in increased runoff and soil loss resulting in indirect negative effects to riparian aquatic and terrestrial species. As a result, wildlife habitat is affected by increased runoff and soil loss, especially if riparian and upland conditions are not properly functioning.

Use of woody and herbaceous vegetation by livestock may result in increased stream temperatures, reduced ground cover, and organic litter which may indirectly affect aquatic and terrestrial wildlife through increased surface runoff and potentially reducing the establishment of additional vegetative cover in the uplands and riparian areas. In addition, habitat available to prey species in the uplands and riparian area may be reduced by livestock grazing, resulting in reduced numbers of prey species and / or increased predation upon those species. Water quality may also be indirectly affected by livestock use in the uplands as a result of decreased infiltration of surface water and livestock fecal accumulation.

Some species fall victim to livestock production inadvertently and unexpectedly. These species' declines are indirect effects of grazing and other industry activities. These effects illustrate the complexity of challenges to wildlife biology on western rangelands (Krausman 1996). Effects include trophic linkage, disease and internal parasitism, external parasitism, and chemical

contamination. The most important ecological conditions that affect the productivity and species composition of arid rangelands today are: fire, livestock grazing, spatial variation in soil, and temporal variation in climate (Dick-Peddie 1993). To manage rangeland ecosystems, humans must manipulate fire and livestock to attain particular goals.

Grazing systems persist under marginal bioclimatic and edaphic conditions of different biomes, leading to the emergence of three regional syndromes inherent to global grazing: desertification, woody encroachment, and deforestation. These syndromes have widespread but differential effects on the structure, biogeochemistry, hydrology, and biosphere-atmosphere exchange of grazed ecosystems (Asner et al. 2004).

Typically the effects of grazing individual species are neither obvious nor demonstrable. Certain related facts are; wildlife occupy ecosystems valued for livestock forage, grazing alters those ecosystems, and many native species associated with those ecosystems have suffered severe population declines

Grazing promotes species diversity (light to moderate), but compromises natural successional processes and also results in elimination of palatable native species. We accept that grazing ungulates may have a place in maintaining elements of the native vegetation, but we must remember that cattle do not add to the natural character of our lands; they merely equalize the balance between competitively suppressed native and grazing-adapted naturalized species. Without some such control of the latter in mesic, relatively unstressed sites, the slower growing native flora is overwhelmed (Hart and Horton 1988).

Herding and salting may improve cattle distribution and at the same time drawing cattle into places that previously received little or no use. For songbirds, nest losses due to brood parasitism by the brown-headed cowbird (hereafter, cowbird) also could be an important indirect effect of livestock. The cowbird is an open habitat species that commonly associates with livestock because of the foraging opportunities livestock provide. In the western United States, expansion of livestock grazing into forested areas appears to have facilitated cowbird population increases and range expansion. Given that brood parasitism generally reduces host nesting productivity increases in cowbird abundance could affect the breeding success of songbird populations (Goguen and Mathews 1998).

A phenomenon related to managed grazing, land degradation, and desertification is the human-mediated dispersal of African grasses worldwide. Introduced African grasses have made their ecological mark in dry land (and tropical) systems in North America, Central and South America, Australia, and Oceania. These grasses compete effectively with native grass species and can alter nutrient cycling and other ecosystem processes (Asner et al. 2004).

Natural process such as resource pulses have greater impacts upon the land where managed grazing occurs. Pulses of rainfall also influence higher trophic levels and entire food webs. Better understanding of how rainfall affects the diversity, species composition, and dynamics of arid environments can contribute to solving environmental problems stemming from land use (Chesson et al. 2004).

Cumulative Effects

- Past and Current Grazing: past grazing actions have resulted in soil erosion and compaction while current management has, in some cases, prevented or slowed recovery.
- Long-term Fire Suppression: a long history of fire suppression has altered the characteristics of many ecosystems. Conifer forests generally have greater fuel loading and a greater density of trees. Other ecosystems (some woodlands, juniper savannas, and semi-desert grasslands) have had an increase in woody plants. Some chaparral stands have become decadent and are at an increased risk of wildfire.
- Mining: there are scattered, unworked mining claims that could become active in the future. There is active uranium exploration taking place. There are scattered old, inactive mines within the analysis area including one CERCLA (Comprehensive Environmental Response Compensation Liability Act) site (Phillips mine covering 362 acres). The mines are currently closed. Mining activity has had only small, localized impacts to vegetation but runoff from mine areas has led to increased soil erosion.
- Major Fires: recent major fires within the analysis area include the 2000 Coon Creek Fire and the 2010 Zimmerman Fire.
- Prescribed fire: the Seven Prescribed Burn covers portions of the Sedow Allotment. The Hackberry Prescribed Fire covers portions of Dagger Allotment. Miscellaneous smaller burns have also occurred.
- Thinning for fuels reduction (Carroll Mountain communications)
- Recent juniper thinning projects including the on-going Timber Camp Woodland Restoration Project
- Juniper Thinning: past juniper treatments, mostly on the Chrysotile Allotment, include juniper chaining and pushes conducted in the past 40 to 60 years.
- Travel Management: unauthorized cross country travel can negatively impact soils and vegetation through direct impacts on soils and removal or degradation of herbaceous or woody vegetation. The Travel Management Rule is intended to analyze alternate motorized routes in order to provide access and a recreation experience sufficient so vehicle operators no longer feel compelled to travel off established roads or trails. Enforcement of the Travel Management Rule is imperative to assure compliance. Improperly maintained roads can cause soil erosion where runoff from roads is allowed to concentrate. Road maintenance that includes Best Management Practices should reduce sedimentation into the streams and be beneficial to the watershed. Roads can be a source of concentrated runoff which can lead to localized soil erosion down slope from roads. Road maintenance that includes BMPs should reduce erosion and be beneficial to the watershed.
- There is a 500 KV Line running for 22 miles through the Poison Springs and Dagger Allotments. A 200 foot right-of-way is maintained by trimming vegetation. This covers about 530 acres.
- Trespass cattle from neighboring reservations.
- Three public sand and gravel sites.
- The introduction of non-native invasive plants has led to an increased risk of erosion and wildfire.
- Climate: recent and ongoing drought and possible future climate change can also impact conditions.
- Reintroduction of special status species across the analysis area and other parts of the Forest that could relocate to the analysis area.

Environmental Consequences - Alternative 1 (No Action)

Direct Effects: removal of waters that wildlife are accustomed to using; no competition for resources with domestic grazers; maintenance and expansion of cryptobiotic crusts.

Effects of protection on bird abundance and richness were stronger during the breeding than wintering season and during a year of high compared to low rainfall. Birds were also more abundant inside than outside livestock exclosures during breeding than wintering seasons in the Chihuahuan Desert (Bock and Webb 1984). Grasshopper sparrows illustrate the point that bird species do not respond to grazing per se, but to its effects on vegetation. Grasshopper sparrows were typical of protected sites in south-eastern Arizona. Cattle may create conditions suitable for grass-hopper sparrows in some ecosystems, whereas they destroy those same conditions in the grasslands of southeastern Arizona (Bock and Webb 1984).

Indirect Effects: lack of maintenance of established waters; increased litter and soil organic matter; reversal of desertification/ecological thresholds; improved watershed health; increase in invasive weeds; increased structural (horizontal and vertical) diversity; impacts from natural processes.

Effects of protective fencing on birds, lizards, black-tailed hares (*Lepus californicus*), perennial plant cover, and structural diversity of perennial plants were evaluated from spring 1994 through winter 1995 at the Desert Tortoise Research Natural Area (DTNA), in the Mojave Desert, California. Abundance and species richness of birds were higher inside than outside the DTNA, and effects were larger during breeding than wintering seasons and during a high than a low rainfall year. Nesting activity was also more frequent inside. Total abundance and species richness of lizards and individual abundances of western whiptail lizards (*Cnemidophorus tigris*) and desert spiny lizards (*Sceloporus magister*) were higher inside than outside (Brooks 1999).

In contrast, abundance of black-tailed hares was lower inside. Structural diversity of the perennial plant community did not differ due to protection, but cover was 50 percent higher in protected areas.

The effect of fifty years protection from livestock grazing was evaluated on an area in the Sonoran Desert using Raunkaier's frequency index method. No appreciable invasion of new species had taken place on the unprotected area and fifty years protection caused no significant change in composition. The most notable change encountered was an over-all increase in plant density on the protected area with perennial grasses and palatable shrubs (*Krameria grayi*) showing the most significant increases (Blydenstein et al. 1957).

Resource pulsing is a special form of environmental variation, and the general theory of coexistence in variable environments suggests specific mechanisms by which rainfall variability might contribute to the maintenance of high species diversity in arid ecosystems (Chesson 2004). What this is saying is that diversity is taken care of by rainfall amount and timing, and native species interactions with plants.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, would generally lead to desired future conditions in a shorter timeframe than other alternatives. Literature suggest that

results may not be seen for at least 20 years and perhaps the ecological threshold has already been passed, and desired future conditions may not be met with exclusion of cattle.

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects

There are no new unique direct effects to wildlife with current management. Refer to discussion on Potential Environmental Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat Common to alternatives 2, 3, and 4.

Indirect Effects: increase in annual grasses and weeds; decrease abundance of perennial grasses and forbs.

Long-term grazing has been shown to decrease abundance of perennial grasses and forbs and increase amount of annual grasses and weeds in deserts (Jones and Longland 1999). Reduced cover of perennial plants may expose vertebrates to greater rates of predation, and reduced structural and species diversity may provide fewer microhabitats and ecological niches (Brooks 1999).

Grazing decreased rodent species diversity in arid environments, probably due to a decline in plant species diversity that resulted from the grazing treatment, and found a negative correlation between grazing intensity and rodent species diversity in arid regions. However, changes can be attributed to structural aspects of vegetation rather than plant species diversity (Jones and Longland 1999).

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions but would require more time than alternatives 1 and 4.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects

Increase in cattle numbers on three allotments; reduction of targeted non-native species (i.e., red brome); reduction of biological crusts thru trampling and continued use of pastures each year; proposed adaptive management tools; proposed range improvements.

Increasing cattle numbers within the analysis area may have magnified impacts on the land when compared with current management. Direct impacts could increase with increasing number of cattle throughout the analysis area.

Indirect Effects

Desertification; reduced establishment of Saguaro seedlings and nurse plants that contribute to Saguaro seedling survival; changes in wildlife species composition, diversity, and richness; increased impacts on game species; changes in plant species composition; proposed adaptive management tools; proposed range improvements.

Game species like Gambel's quail, mule deer, javelina, and cottontails may continue downward trends in the analysis area from current conditions if cattle numbers are increased (Sayer and Rodriguez 2012). Other wildlife may have to compete more for resources as numbers increase.

A two-year survey of winter-germinating annual plants in southern Arizona indicates that species diversity declines consistently as a function of increasingly recent grazing by cattle (Waser and Price 1981).

Reduced lizard abundance and diversity at heavily grazed study sites would seem to result from changes in vegetative structure, primarily the loss of low-height vegetation. In Sonoran Desert scrub, cattle totally consumed the small amounts of available perennial grass but did not reduce the amount of abundant, non-palatable shrubs (i.e., triangle-leaf bursage). The result is little change in low-height perennial structure (Jones 1981).

Reduced lizard abundance and diversity at heavily grazed study sites would seem to result from changes in vegetative structure, primarily the loss of low-height vegetation. In all but Sonoran Desert scrub, cattle reduced low-height structure by totally consuming perennial grass and severely reducing the composition of palatable shrubs (Jones 1981).

Saguaro populations, it was concluded, would be strongly influenced by forces such as grazing which alter the number of shade-producing perennial plants with which the saguaro grows (Turner et al. 1966).

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may not lead to desired future conditions.

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

Direct Effects

The uncertainty of the rainy seasons and the severity and length of droughty periods in the Southwest make it imperative to conserve rangelands during periods of seed maturation and seed germination (Thorner 1910). Seasonal grazing with complete rest of pastures for at least six months and during drought would benefit habitat quality. Not grazing the Salt River would have some benefit to this vegetation type as it does border the Salt River for many miles. Restoration work would provide increased biodiversity, natural functioning of uplands (food webs), and resiliency to drought and other disturbances (insects, disease, fire). Reintroduction of special status species is important to the overall biodiversity of the system.

Indirect Effects

Increased establishment of cryptobiotic crusts because of greater rest between pasture uses with winter grazing and a deferred rest rotation; enhanced distribution of cattle across landscape; increase in vegetative structure (vertical and horizontal); decreased impacts on game species.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than alternative 2, but not as quickly as alternative 1.

Effects of vegetation management tools

Grazing and browsing above conservative use levels may cause a downward trend in wildlife habitat quality by removing forage, cover, and water for wildlife species.

High intensity, short-duration grazing may cause a downward trend in habitat quality. In this vegetation type, precipitation amounts do not allow for sufficient recovery as this treatment could remove most wildlife habitat. Effects would increase with increased treatment area size.

Fencing and herding may be beneficial or neutral for habitat quality, if animals are actively managed to spread distribution across whole pastures and fencing is used to exclude areas that are impaired. Placement, design, and density would influence effects. Fencing can cause mortality to wildlife, affect wildlife movement, and decrease habitat quality.

Water developments to improve livestock distribution: Habitat quality would likely remain stable across a landscape scale. Locally, habitat quality may trend downward based on increase impacts where new waters are located. Any water development created using springs or seeps could have an undesirable effect on habitat quality around those sites. Impacts to springs may also reduce biodiversity and reduce stopover habitat for migratory birds.

Erosion control structures may result in an upward trend in localized spots where structures are placed. Overall trend would be neutral for habitat quality.

Seeding and planting of native vegetation in concurrence with grazing would not benefit wildlife habitat quality. It could also introduce non-local seed sources.

Placement and density of salt or low moisture blocks may influence wildlife habitat. Habitat quality would remain stable on a landscape scale. Locally, habitat quality would trend downward based on increased impacts where salt/low moisture blocks are located. Placement near or within drainages could have undesirable impacts on spring, seep, and stream habitat and water quality.

If *noxious weed treatment* is implemented, habitat quality would be lowered initially but over time, as native vegetation becomes established, overall habitat quality would improve. This would only occur if native vegetation is allowed to establish following treatment. Fire treatments in Sonoran desert may have more undesirable effects than benefits unless a very specific prescription is applied. Treatment effects may also vary with post treatment grazing strategy

Existing Condition and Effects Analysis - Semi-desert Grassland

This habitat type has diverged significantly from its native condition. The landscape was historically dominated perennial bunch grasses and grama grasses interspersed with low shrubs and bare ground. A large proportion of this habitat has been invaded by upper Sonoran and juniper savannah vegetation types.

Table 9: Plant and Animal Species of Concern

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
Morafka's Desert Tortoise (C)	Arizona Toad	Black-throated Sparrow	Golden Eagle	American Black Bear	Baird's Sparrow
	Lowland Leopard Frog	Canyon Towhee	Swainson's Hawk	Mule Deer	Western Grasshopper Sparrow

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
	American Peregrine Falcon			Mourning Dove	Sprague's Pipit
	Spotted Bat			White-winged Dove	Ferruginous Hawk
	Greater Western Mastiff Bat			Gambel's Quail	Olive-sided Flycatcher
	California Leaf-nosed Bat			Mountain Lion	Sage Thrasher
	Rocky Mountain Bighorn Sheep			Bobcat	Western Purple Martin
				Mearn's Quail	Western Yellow Bat
				Javelina	

Federally Listed Species

There is potential habitat for Morafka's desert tortoise within this vegetation type. There have been no records of this species in the analysis area within this vegetation type.

Forest Sensitive Species

There is a population of Rocky Mountain bighorn sheep within this vegetation type along Salt River and on Black Mesa. American peregrine falcons nest in the cliffs of Salt River and Coon Creek within this vegetation type. Other species have the potential of being in this habitat although no direct observations have been made.

Bald and Golden Eagles

Golden eagles occur within the project area and can be expected to forage opportunistically within semi-desert vegetation. Golden eagles forage over large areas of open habitats on a variety of animals including rabbits, juvenile deer and javelina.

Game Species (Harvest Emphasis Species)

Habitat quality for mule deer has declined as a result of decrease diversity of plant communities; there has been an increase in woody and invasive species abundance and a decrease in important perennial forb and native grass species. The quantity, quality and variety of forage plants for mule deer is one of the most important factors influencing deer production and survival (Wakeling and Bender 2003, Heffelfinger et al. 2006). Perennial forb and native grass species provide hiding cover for fawns from predation by coyotes, their primary predator. Reductions in forb and grass cover negatively affect fawn survival. While precipitation affects the quantity and quality of forage, and drought conditions can cause deer mortality; habitat changes as a result of livestock grazing and lack of natural fire regimes are also important contributing factors to population declines in some areas. Bighorn sheep forage availability is similarly impacted.

Water Resources

Main sources of water within this vegetation type of characterized by springs, dirt tanks, and wells. Distribution across the landscape is low in this vegetation type. A majority of springs are developed.

Summary

Dagger Allotment was in nonuse for ten years and has only been recently active with cattle grazing. Semi-desert grassland on this allotment was improving. A majority of this vegetation type occurs on this allotment.

Overall, this vegetation type is in poor condition across the analysis area from prolonged drought. Lack of regular fires and grazing pressure, including historic periods of overgrazing, combined with drought and vegetative invasion of upper Sonoran and juniper savannah, may have led to vegetative type conversion of large areas.

Environmental Consequences - Alternative 1 (No Action)

Environmental Consequences – Alternative 1

Direct Effects:

- No competition to native grazers and browsers
- Removal of livestock waters

Indirect Effects:

- Proliferation of shrubs and woody plants
- Healing of gullies and other erosive processes
- Increased herbaceous ground cover and litter
- Increase in structural (horizontal and vertical) diversity
- Upward trend in habitat quality
- Upward trend in biodiversity of wildlife and plant species
- Reversal of desertification
- Reversal in game species population trends

We suggest that long time lags in grass recovery exist for two possible reasons. First, perennial grass seed production and establishment are episodic in the arid southwest. Given that specific environmental conditions are required for both seed production and establishment, it is not surprising that more than two decades are required to observe significant increases in grass cover following the removal of livestock. Second, trampling by livestock reduces microtopographic soil structure which can then retard grass seedling establishment (Nash et al. 2003). Perhaps more than 20 years are required for trampled soils to re-establish sufficient microtopographic structure to facilitate perennial grass seedling establishment (Valone and Sauter 2005).

Contrary to widely held assumptions, protection from livestock since 1932 not only failed to deter woody-plant proliferation, but actually promoted it relative to grazed areas. Results suggest (1) that thresholds for grassland resistance to shrub encroachment had been crossed by the 1930s, and (2) fire management rather than grazing management may be crucial to maintaining grassland physiognomy in this bioclimatic region (Browning and Archer 2011).

The grazed area supported significantly higher numbers of birds in summer, while densities did not differ in winter. Rodents were significantly more abundant in protected areas. Species of birds and rodents more common in grazed areas included those typical of more xeric lowland habitats and those preferring open ground for feeding. Species more common on the protected site were those which characterize semi desert or plains grasslands, and which prefer substantial grass or shrub cover. Grazing appeared to favor birds as a class over rodents (Bock et al. 1984).

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than other alternatives. Literature suggest that results may not be seen for at least 20 years and perhaps the ecological threshold has already been passed, and desired future conditions might not be met with exclusion of cattle.

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects

There are no new unique direct effects to wildlife with current management. Refer to discussion on Potential Environmental Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat beginning on page 134.

Indirect Effects

There are no new unique indirect effects to wildlife with current management. Refer to discussion on Potential Environmental Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat beginning on page 134.

Cumulative Effects

Direct and indirect effects of this alternative when combined with other past, present, and future conditions may lead to desired future conditions, but at a slower rate than alternatives 1 and 4.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects

Increase of cattle within three allotments; decrease in ground cover and litter; increased competition with native grazers and browsers; increased impacts on special status (MIS, MBTA, and Forest Sensitive) species; increasing cattle numbers within the analysis area may have magnified impacts on the land when compared with current management. Direct impacts could increase with increasing number of cattle throughout the analysis area.

Indirect Effects

Managed livestock grazing can have these general indirect impacts on wildlife and habitat quality: alter the composition of the plant community (desertification); increase the productivity/biomass of selected plant species; increase diversity of habitat by altering its structure. This only occurs with light grazing (up to 30 percent); alter the natural fire regime; decline in wildlife and plant species diversity; avoidance by wildlife; trophic linkage, disease and internal parasitism, external parasitism, and chemical contamination; decrease in breeding success of grassland birds; decreased water filtration impacting watersheds; reduction of soil organic

matter and soil moisture; increase in particulate generation, and significant changes in biogeochemical cycles.

Desertification is often characterized by the replacement of mesophytic grasses with xerophytic shrubs. Livestock grazing is considered a key driver of shrub encroachment, although most evidence is anecdotal or confounded by other factors (Browning and Archer 2011). Other factors include altering of fire regime, prolonged drought, and timing of precipitation.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may not lead to desired future conditions

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

Direct Effects

Winter/spring grazing is not an effective tool for this vegetation type. Seasonal grazing from May through October has been shown to increase vegetative production in this habitat type creating higher quality winter habitat for elk and mule deer. This would be beneficial to grassland birds by providing undisturbed nesting areas. Resting these areas two consecutive seasons would help improve habitat quality. This type of grazing strategy would benefit habitat quality by allowing fire to return at the right time of year and allowing it to carry because of increased production of fine fuels. Not grazing the Salt River corridor would have some benefit to this vegetation type as it does border the river for many miles. Oak Creek Mesa Pasture has grasslands on mesa tops that would also benefit from no grazing. Restoration work would be beneficial to habitat quality. Restoration would provide increased biodiversity, natural functioning of uplands, and resiliency to drought and other disturbances (insects, disease, fire). Reintroduction of special status species would be important to overall biodiversity of the system.

Indirect Effects: Increased biodiversity with species reintroductions; reduced impacts from current management with seasonal grazing; increased rest for pastures can help improve wildlife habitat.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than alternative 2, but not as quickly as alternative 1.

Effects of vegetation management tools

Grazing and browsing above conservative use levels may cause a downward trend in habitat quality. Direct effects can include mortality to nesting juvenile birds and eggs from trampling. Indirect effects can include removing wildlife cover, forage, and water, and affecting soil/animal interactions. Effects would increase as the size of treatments increases. Continued grazing often limits options for wildlife habitat improvements and restoration efforts.

High intensity short duration grazing may cause a downward trend in habitat quality (see effects for grazing/ browsing above conservative use levels).

Fencing and herding: see tools effects for Sonoran Desert.

Water developments to improve livestock distribution: see tools effects for Sonoran Desert.

Erosion control structures: see tools effects for Sonoran Desert.

Seeding and planting of native vegetation: Used in concurrence with grazing, in most cases, this would not benefit habitat quality, unless it is coordinated with specific timing/intensity/duration of grazing prescriptions. Short duration grazing could be used to "plant" seeds. It could also introduce non-local seed sources.

Placement and density of salt or low moisture blocks: see tools effects for Sonoran Desert.

If *noxious weed treatment* is implemented, habitat quality would be lowered initially but over time, as native vegetation becomes established, overall habitat quality would improve. This would only occur if native vegetation is allowed to establish following treatment. Treatment effects may vary with post treatment grazing strategy.

Fuels reduction through prescribed fire and mechanical methods: overall upward trend in habitat quality but short-term effects on individuals of many species would be possible depending on treatment design, extent, and timing.

Existing Condition and Effects Analysis - Juniper Savannah

Table 10: Plant and Animal Species of Concern

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
	American Peregrine Falcon	Horned Lark	Gray Flycatcher	American Black Bear	Ferruginous Hawk
	Spotted Bat	Ash-throated Flycatcher	Black-throated Gray Warbler	Mule Deer	Swainson's Thrush
	Greater Western Mastiff Bat	Gray Vireo	Golden Eagle	Gambel's Quail	Olive-sided Flycatcher
	Western Red Bat	Townsend's Solitaire		Mountain Lion	Sage Thrasher
	California Leaf-nosed Bat	Juniper Titmouse		Bobcat	Western Purple Martin
		Northern Flicker		Coues White-tailed Deer	Red-naped Sapsucker
		Spotted Towhee		Elk	<i>Oreohelix Yavapai cummingsi</i>
		Savannah Sparrow			Western Yellow Bat
					Hualapai Mexican Vole

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
					Big Free-tailed Bat
					Arizona Shrew

Federally Listed Species

There are not any listed species within this habitat type.

Forest Sensitive Species

All other sensitive species have been found within the analysis area. No population trend data are available. Peregrine falcons mainly use this habitat for foraging and nest in the cliffs above this elevation type.

Management Indicator Species

Based on Atlas breeding block records (AZGFD 2005) and district surveys (Tonto NF 2005) all species have been observed in the project area, except horned lark and savannah sparrow, and are expected to be relatively common within indicator habitat. Fire suppression and livestock grazing have affected wildlife habitat quality (edge, food, and structure) by increasing the component of over mature and mature shrubs, reducing the component of palatable browse and understory grasses. Northern flicker and Townsend's solitaire are generally only found during the winter. Savannah sparrows are generally only seen during migration.

Bald and Golden Eagles

Both species occur within the project area and can be expected to forage. Bald eagles forage most frequently at major water sources including lakes and streams. Upland chaparral vegetation has few suitable water sources for foraging. Golden eagles forage over large areas of open habitats on a variety of animals including juvenile deer and javelina.

Game Species (Harvest Emphasis Species)

Critical areas have been identified for this vegetation type. They are scattered throughout the analysis area. The mule deer segment of the deer population along the Salt River Analysis area is stable to slightly increasing on a ten year trend. The white-tailed deer segment of the deer population is decreasing slightly, but consistently, from a ten-year high in 2008 north of the Salt River. The southern portion of the Salt River has seen a slight increase overall within the analysis area. White-tailed deer have been observed habituating within areas that mule deer typically occur.

Water Resources

Water is scarce within this vegetation community. The main sources of water are stock tanks and springs/seeps. The majority of the springs are developed for use with cattle grazing. Ash Creek and Coon Creek meander through this vegetation type and have some perennial water.

Summary

This vegetation type has invaded semi-desert grassland vegetation creating a substantial increase in edge effects and reducing habitat quality. The overstory has increased from less than 10 percent to over 50 percent and greater in large tracts of land. This was caused by a number of

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factors including grazing, fire suppression, drought, and other recreational activities. Overall habitat quality is poor.

Environmental Consequences - Alternative 1 (No Action)

Direct Effects: no competition to native grazers and browsers; removal of livestock waters.

Indirect Effects: proliferation of shrubs and woody plants; healing of gullies and other erosive processes; increased herbaceous ground cover and litter; increase in structural (horizontal and vertical) diversity; upward trend in habitat quality; upward trend in biodiversity of wildlife and plant species; reversal of desertification; reversal in game species population trends.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than other alternatives. Literature suggest that results may not be seen for at least 20 years and perhaps the ecological threshold has already been passed, and that desired future conditions might not be met with exclusion of cattle.

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects

There are no new unique direct effects to wildlife with current management. Refer to discussion on Potential Environmental Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat beginning on page 134.

Indirect Effects

There are no new unique indirect effects to wildlife with current management. Refer to discussion on Potential Environmental Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat beginning on page 134.

Cumulative Effects

Direct and indirect effects of this alternative when combined with other past, present, and future conditions may lead to desired future conditions, but at a slower rate than alternatives 1 and 4.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects

Increasing cattle numbers within the analysis area could have magnified impacts on the land when compared with current management. Direct impacts could increase with increasing number of cattle throughout the analysis area.

Indirect Effects: proliferation of woody plants from decreased herbaceous cover competition; desertification.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may not lead to desired future conditions.

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

Direct Effects

A seasonal grazing strategy would benefit habitat quality by allowing fire to return at the right time of year and allowing it to carry because of increased production of fine fuels. This vegetation type is the majority of Oak Creek Mesa Pasture. These lands have been ungrazed for 12 years and show great understory diversity. Resting them into the future would continue to improve habitat conditions. Restoration techniques would provide increased biodiversity, natural functioning of uplands (food webs), and resiliency to drought and other disturbances (insects, disease, fire). Small openings in the relatively unbroken pinyon-juniper woodlands would benefit a wide variety of species: deer, small mammals and some species of songbirds. These results generally agree with other studies that show openings can increase vegetation biomass, and increase deer use and small mammal populations (Albert et al. 1994). Reintroduction of special status species is important to overall biodiversity of this system.

Indirect Effects: habitat quality for wildlife should show an upward trend with seasonal winter grazing.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than alternative 2, but not as quickly as alternative 1.

Effects of vegetation management tools

Grazing and browsing above conservative use levels may cause a downward trend in habitat quality because wildlife forage and cover would be removed before there were effects on nonnatives or woody plants.

High intensity short duration grazing may cause a downward trend in habitat quality because high utilization would remove most existing wildlife habitat. Effects would increase with frequency of treatment and size of area.

Fencing and herding: see tools effects for Sonoran Desert.

Water developments to improve livestock distribution: see tools effects for Sonoran Desert.

Erosion control structures: see tools effects for Sonoran Desert.

Seeding and planting of native vegetation: see tools effects for semi-desert grassland.

Placement and density of salt or low moisture blocks: see tools effects for Sonoran Desert.

If *noxious weed treatment* is implemented, initially habitat quality would be lowered, but over a period of time as native vegetation becomes established overall habitat quality would improve. Placement, design, size, and intensity of treatments would determine extent of effects. Treatment effects may also vary with post-treatment grazing strategy.

Timber and fuel wood sales for tree density management: Neutral to upward trend in habitat quality. Effects depend on aspect, slope, and type of prescription used for area based off soil composition and ability of area to recover plant diversity. Using harvest methods in conjunction

with prescribed fire, rest from grazing, and optimum canopy cover requirements for forest dependent wildlife would have greatest benefits. As size and intensity of treatments increase, effects would generally increase.

Fuels reduction through prescribed fire and mechanical methods: overall upward trend in habitat quality, but short-term effects on individuals of many species would be possible depending on treatment design, extent, and timing.

Existing Condition and Effects Analysis- Juniper Woodland

Table 11: Plant and Animal Species of Concern

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
Chiricahua Leopard Frog	Arizona Toad	Horned Lark	Black-throated Gray Warbler	Elk	Swainson's Thrush
Mexican Spotted Owl	Lowland Leopard Frog	Ash-throated Flycatcher	Golden Eagle	Mule Deer	Olive-sided Flycatcher
	Western Barking Frog	Gray Vireo	Gray Flycatcher	Coue's White-tailed Deer	Western Purple Martin
	Northern Goshawk	Townsend's Solitaire	Gray Vireo	American Black Bear	Red-naped Sapsucker
	Spotted Bat	Juniper Titmouse	Juniper Titmouse	Turkey	Western Yellow Bat
	California Leaf-nosed Bat	Northern Flicker	American Peregrine Falcon	Mountain Lion	Big Free-tailed Bat
		Spotted Towhee	Pinyon Jay	Bobcat	Arizona Shrew
		Savannah Sparrow		Arizona Gray Squirrel	

Federally Listed Species

There have been no observations of threatened and endangered species being found within this vegetation type. There is some potential habitat for Chiricahua leopard frog in upper Coon Creek and in Ash Creek. Mexican spotted owls will use this area during winter, as they tend to migrate in elevation in search of better foraging opportunities.

Arizona hedgehog cactus (Endangered)

This robust perennial cactus occurs on both the Apache-Sitgreaves and Tonto national forests in Arizona. It has dark green cylindroid stems that occur as single stems, or more frequently, clusters of stems. Flowers are bright red or crimson. It occurs within Interior Chaparral and Madrean Evergreen Woodland communities at elevations ranging from 3,300 to 5,700 feet. Preferred habitat is found on parent materials of igneous origin, primarily Schultze Granite and Apache Leap Tuff (Dacite); plants occurring on the Pinal schist and Pioneer formations are found only in proximity to the preferred parent materials and where the formations are expressed as exposed bedrock.

The plant occurs on Apache Peak north of Globe. No critical habitat was identified for this species at the time of listing (1979). Although no recovery plan has been developed a Conservation Assessment and Plan for the Tonto NF was completed in 1996. Guidance Criteria for evaluating the effects of livestock grazing on Arizona hedgehog cactus for Tonto National Forest was prepared by Angie Brooks, former U.S. Fish and Wildlife Service biologist (4/27/99).

Livestock may be a threat in accessible areas, but observed damage to hedgehog cacti was noted at approximately one specimen per 400 to 500 observations, and javelina damage was found to be much more common (Tonto CA 1996.)

Forest Sensitive Species

There is an unconfirmed report of a barking frog caught in the Sierra Ancha of central Arizona (Wright and Wright 1949). All other sensitive species have been found within the analysis area. No population trend data are available except for Northern goshawk, which is showing a stable/increase trend in population.

Management Indicator Species

Based on Atlas breeding block records (AZGFD 2005) and district surveys (U.S. Forest Service 2005) all species have been observed in the project area, except horned lark, and are expected to be relatively common within indicator habitat. Fire suppression and livestock grazing can affect wildlife habitat quality (edge, food, structure) by increasing the component of over-mature and mature shrubs, reducing the component of palatable browse and understory grasses. Savannah sparrow is uncommon within the analysis area. Northern flicker and Townsend's solitaire are only found during migration and in the winter months.

Bald and Golden Eagles

Both species occur within the project area and can be expected to forage. Bald eagles forage most frequently at major water sources, including lakes and streams. Juniper woodland vegetation has few suitable water sources for foraging. Golden eagles forage over large areas of open habitats on a variety of animals including juvenile deer and javelina.

Game Species (Harvest Emphasis Species)

Critical areas have been identified for this vegetation type and are scattered throughout the project area. The mule deer segment of the deer population within the project area is stable to slightly increasing on a ten year trend. The white-tailed deer segment of the deer population is decreasing slightly, but consistently, from a ten year high in 2008 north of Salt River. The southern portion of Upper Salt River has seen a slight increase overall within the analysis area. White-tailed deer have been observed habituating within areas that mule deer typically occur.

Water Resources

Water is important to most wildlife species and its distribution over a landscape can affect habitat use. Within juniper woodland vegetation, there are streams, which are generally ephemeral or intermittent and springs/seeps and man-made water sources including dirt stock tanks and metal or cement livestock water troughs, which collect their water from the natural sources, or wells. Currently, average distance between reliable water sources within chaparral vegetation is approximately 1 to 1.5 miles.

Summary

Overall habitat quality is poor to fair. Fire suppression has altered community composition to favor trees and shrubs over grasses, creating a moderate risk of losing key ecosystem components. Historical heavy grazing and persistent drought have all contributed to the state of this vegetation type. Juniper woodlands were significantly impacted by Coon Creek Fire north of Salt River and have been rested from cattle grazing on both Dagger and Poison Springs allotments. This has resulted in beneficial regeneration of key forage species.

Environmental Consequences - Alternative 1 (No Action)

Direct Effects

No competition to native grazers and browsers; removal of livestock waters

Indirect Effects

Proliferation of shrubs and woody plants; healing of gullies and other erosive processes; increased herbaceous ground cover and litter; increase in structural (horizontal and vertical) diversity; upward trend in habitat quality; upward trend in biodiversity of wildlife and plant species; reversal of desertification; reversal in game species population trends.

Cumulative Effects

Because of historical use woody plants would have an increased competitive advantage over understory species. Depletion and weakening of grasses and palatable forbs so that their competitive effect on new and establishing tree seedling would be slight could occur.

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than other alternatives. Literature suggest that results may not be seen for at least 20 years and perhaps the ecological threshold has already been passed, and that desired future conditions might not be met with exclusion of cattle.

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects

There are no new unique direct effects to wildlife with current management. Refer to discussion on Potential Environmental Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat Common to alternatives 2, 3, and 4.

Indirect Effects

There are no new unique indirect effects to wildlife with current management. Refer to discussion on Potential Environmental Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat beginning on page 134.

Cumulative Effects

Because of historical use woody plants would have an increased competitive advantage over understory species. Depletion and weakening of grasses and palatable forbs so that their competitive effect on new and establishing tree seedlings would be slight could occur.

Direct and indirect effects of this alternative when combined with other past, present, and future conditions may lead to desired future conditions, but at a slower rate than alternatives 1 and 4.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects

Increasing cattle numbers within the analysis area could have magnified impacts on the land when compared with current management. Direct impacts could increase with an increasing number of cattle throughout the analysis area.

Indirect Effects

Possible continuation of canopy closure; desertification; ecological threshold may be passed.

Cumulative Effects

Because of historical use woody plants would have an increased competitive advantage over understory species. Depletion and weakening of grasses and palatable forbs so that their competitive effect on new and establishing tree seedlings would be slight could occur.

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may not lead to desired future conditions.

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

Direct Effects

See discussion of effects for alternative 4, juniper savannah.

Indirect Effects

Habitat quality for wildlife should show an upward trend with seasonal winter grazing.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than alternative 2, but not as quickly as alternative 1.

Effects of vegetation management tools

Grazing and browsing above conservative use levels: effects would be similar to those described for juniper savannahs. Grazing may increase density of woody shrubs and trees.

High-intensity, short duration grazing could generate effects similar to those described for grazing above conservative use levels, described above.

Fencing and herding: see tools effects for Sonoran Desert.

Water developments to improve livestock distribution: see tools effects for Sonoran Desert.

Erosion control structures: see tools effects for Sonoran Desert.

Seeding and planting of native vegetation: see tools effects for semi-desert grassland.

Placement and density of salt or low moisture blocks: see tools effects for Sonoran Desert.

If *noxious weed treatment* is implemented, effects would be similar to those described for juniper savannahs.

Timber and fuel wood sales for tree density management: effects would be similar to those described for juniper savannahs.

Fuels reduction through prescribed fire and mechanical methods: effects would be similar to those described for juniper savannahs.

Existing Condition and Effects Analysis - Turbinella Oak Chaparral

Wildlife species inhabiting chaparral are generally wide-ranging species, which also inhabit other habitat types. In the project area, one endangered plant occurs primarily in chaparral. There are two Tonto NF Management Indicator Species for chaparral vegetation, and one migratory bird species of concern. No Tonto NF sensitive species occur primarily in upland chaparral vegetation.

Table 12: Plant and Animal Species of Concern

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
Arizona Hedgehog Cactus	Lowland Leopard Frog	Spotted Towhee	Black-chinned Sparrow	Mule Deer	Swainson's Thrush
	Western Barking Frog	Black-chinned Sparrow		Coues White-tailed Deer	Olive-sided Flycatcher
	Arizona Toad			Elk	Sage Thrasher
	Common Blackhawk			American Black Bear	Red-naped Sapsucker
	American Peregrine Falcon			Mountain Lion	Western Yellow Bat
	Spotted Bat			Arizona Gray Squirrel	Big Free-tailed Bat
	Greater Western Mastiff Bat				Jaguar
	Western Red Bat				
	California Leaf-nosed Bat				

Federally-listed Species

These species are protected under the Endangered Species Act. One endangered plant, the Arizona hedgehog cactus (AHC) occurs within chaparral vegetation where it almost always occurs on bedrock and rock outcrops. It may occur infrequently on the Hicks Pikes-Peak Allotment within the Horseshoe Bend and Hope pastures near the western edge of the Apache Mountains, but no habitat is present elsewhere in the project area. Arizona hedgehog cactus plants can generally be avoided during forest development projects, but plants have had to be removed during major projects including highways, roads, and mines. Arizona hedgehog cactus plants can also be burned during wildfires and management fires and destroyed during suppression activities.

Management Indicator Species

Black-chinned sparrow and spotted towhee are Tonto NF Management Indicator Species (MIS) for chaparral vegetation. The black chinned sparrow is an indicator of shrub diversity in chaparral while the spotted towhee is an indicator of chaparral shrub density. Key habitat components for the black-chinned sparrow in indicator habitat include dense, mixed species stands of chaparral with openings, and a variety of age classes including scattered tall shrubs. Large, dense stands of un-fragmented chaparral are the key habitat component for spotted towhee.

Based on Atlas breeding block records (AZGFD 2005) and district surveys (U.S. Forest Service 2005) both species have been observed in the project area and are expected to be relatively common within indicator habitat. Fire suppression and livestock grazing can affect wildlife habitat quality (edge, food, structure) by increasing the component of over mature and mature shrubs, reducing the component of palatable browse and understory grasses.

Bald and Golden Eagles

Both species occur within the project area and can be expected to forage opportunistically within chaparral vegetation. Bald eagles forage most frequently at major water sources including lakes and streams. Upland chaparral vegetation has few suitable water sources for foraging. Golden eagles forage over large areas of open habitats on a variety of animals including juvenile deer and javelina.

Game Species (Harvest emphasis species)

No critical areas for game species are identified in chaparral vegetation; however, game species use chaparral depending on its habitat quality for each species. Currently, in many areas, stands of mature and over mature chaparral may be limiting habitat quality for game and other species.

Water Resources

Water is important to most wildlife species and its distribution over a landscape can affect habitat use. Within upland chaparral vegetation, there are streams, which are generally ephemeral or intermittent and springs/seeps and man-made water sources including dirt stock tanks and metal or cement livestock water troughs, which collect their water from the natural sources, or wells. Currently, average distance between reliable water sources within chaparral vegetation is approximately 1 to 1.5 miles.

Summary

Habitat quality is in fair to poor condition because of fire suppression. There is very little diversity in seral stage classes and overall plant species diversity is low. Grazing, historically, has not been a major stressor in this vegetation type. Climate change has allowed this vegetation type to convert to conifer forests (after wildfires) and pinyon juniper woodlands.

Environmental Consequences - Alternative 1 (No Action)

Direct Effects

No competition to native grazers and browsers; removal of livestock waters.

Indirect Effects

Healing of areas with erosion problems by increasing herbaceous cover and litter.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, would generally lead to desired future conditions in a shorter timeframe than other alternatives.

Environmental Consequences - Alternative 2 (Current Management)

Direct and Indirect Effects

There are no new unique direct or indirect effects to wildlife with current management. Refer to discussion on Potential Environmental Effects of Livestock Grazing on Terrestrial and Aquatic Wildlife and Habitat beginning on page 134.

Cumulative Effects

Direct and indirect effects of this alternative when combined with other past, present, and future conditions would lead to desired future conditions, but at a slower rate than alternatives 1 and 4.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects

Increasing cattle numbers within the analysis area could have magnified impacts on the land when compared with current management. Direct impacts could increase with increasing number of cattle throughout the analysis area.

Indirect Effects

Erosion; creation of openings to provide structural diversity.

Cumulative Effects

Historic reports indicate that chaparral was more open than it is today. Heavy, year-long grazing eventually depleted perennial grasses. Introduced annual grasses and forbs, typical of the Mediterranean area, largely replaced native perennials that once grew in openings and the understory of plants. Woody shrub density has also gotten thicker, influenced by fire suppression (Bolander 1982).

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions.

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

Direct Effects

This vegetation type does not receive a lot of use by cattle with the lack of grass production and late seral stage this vegetation type is currently in. Livestock use should be deferred until after fawning where herbaceous cover is an important structural component of fawning habitat, because livestock grazing reduces structure (Loft et al. 1987). This type of grazing strategy could benefit habitat quality by allowing fire to return at the right time of year and its ability to carry because of increased production of fine fuels. This alternative could be highly beneficial to habitat quality. Prescribed grazing as a useful tool to manipulate white-tailed deer habitat is an unproven hypothesis, but is a tool that needs to be experimented with. Restoration could provide increased biodiversity, natural functioning of uplands (food webs), and resiliency to drought and other disturbances (insects, disease, fire). Reintroduction of special status species would be important to the overall biodiversity of the system.

Indirect Effects

Habitat quality for wildlife should show an upward trend with seasonal winter grazing.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than alternative 2, but not as quickly as alternative 1.

Effects of vegetation management tools

Grazing and browsing above conservative use levels: habitat quality would be stable.

High intensity short duration grazing could be beneficial for habitat quality, if tool was used once and then area was rested for a time interval similar to natural fire regime to allow for plants to establish. Continued use of this tool would result in a downward trend to habitat quality. Also, there would be a downward trend if used in conjunction with prescribed fire.

Fencing and herding: Beneficial to neutral for habitat quality, if animals are actively managed to keep distribution across whole pastures and fenced out of areas that are impaired. Placement, design, and density would influence effects. Fencing not built to forest wildlife standards can cause mortality to wildlife, affect wildlife movement, and decrease habitat quality.

Water developments to improve livestock distribution: Placement, design, and density influence effects. Habitat quality would remain stable on a landscape scale. Locally, habitat quality would trend downward based on increased impacts where new waters are located. Any water development created using springs or seeps would adversely impact habitat quality. Impacts on springs may also reduce biodiversity and reduce stopover habitat for migratory birds.

Erosion control structures: see tools effects for Sonoran Desert.

Seeding and planting of native vegetation: Used in concurrence with grazing, in most cases, this would not benefit habitat quality unless it is coordinated with specific timing, intensity, or duration of grazing prescriptions. Short duration grazing could be used to "plant" seeds. It could also introduce non-local seed sources.

Placement and density of salt or low moisture blocks: see tools effects for Sonoran Desert.

If *noxious weed treatment* is implemented, initially habitat quality would be lowered but over a period of time as native vegetation becomes established overall habitat quality would improve. Treatment effects may also vary with post-treatment grazing strategy.

Fuels reduction through prescribed fire and mechanical methods: Overall upward trend in habitat quality, if used with the natural fire regime. Using prescribed fire could have an adverse impact if used too frequently. Short-term effects on individuals of many species are possible depending on treatment design, extent, and timing.

Existing Condition and Effects Analysis- Ponderosa Pine and Mixed Conifer

Table 13: Plant and Animal Species of Concern

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
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Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
Mexican Spotted Owl	Arizona Bugbane	Elk	Flammulated Owl	Mule Deer	Arizona Toad
Chiricahua Leopard Frog	Blumer's Dock	Wild Turkey	Northern Goshawk	Coues White-tailed Deer	Swainson's Thrush
	Northern Goshawk	Pygmy Nuthatch	Olive-sided Flycatcher	Elk	Pine Grosbeak
	Zone-tailed Hawk	Violet-green Swallow	Grace's Warbler	Arizona Gray Squirrel	Western Purple Martin
	American Peregrine Falcon	Western Bluebird	Lewis' Woodpecker	Merriam's Turkey	Big Free-tailed Bat
	Common Blackhawk	Hairy Woodpecker	Olive Warbler	Mountain Lion	Jaguar
	Lowland Leopard Frog	Northern Goshawk	Band-tailed Pigeon	American Black Bear	Arizona Shrew
	Longfin Dace	Abert's Squirrel	Cordilleran Flycatcher	Bobcat	
	Desert Sucker		Red-faced Warbler	Tassel-eared Squirrel	
	White-nosed Coati		Golden-crowned Warbler	Rainbow Trout	
	Spotted Bat		Red-naped Sapsucker	Brown Trout	
	Greater Western Mastiff Bat				
	Western Red Bat				

Federally Listed Species

There are nine Mexican spotted owl protected activity centers (PACS) within this vegetation type 13,800 acres of critical habitat within the Sierra Ancha Mountains. The PACs are found on Dagger (8) and Chrysotile (1) allotments. Chiricahua leopard frog could exist within this vegetation type given the habitat has the primary constituent elements. The most likely areas for the frog to occur are in Ash Creek and Oak Creek Mesa Pasture. Surveys have not been completed in upper Oak Creek Mesa Pasture, but have been completed along Ash Creek with no frogs being detected.

Mexican Spotted Owl (Threatened with Critical Habitat)

General Effects:

Although effects of grazing on MSO are complex, they generally fall into two categories:

1. Those that result in relatively short-term effects requiring short recovery periods to restore suitable habitat characteristics.
2. Those that result in long-term alterations in plant-species composition and vegetation structure.

For example, properly managed grazing in key owl foraging areas that consistently maintains residual herbaceous biomass of forage species, sufficient to allow for individual plants to recover and reproduce during most growing seasons, should provide cover and food sources for some prey species (especially during drought periods), and may also prove beneficial to owls over the long-term by cropping plants to a level that increases owls' access to prey species associated with herbaceous cover habitat types. In contrast, grazing that allows for moderate- to high intensity grazing throughout several successive growing seasons may result in impaired vegetation productivity and ultimate changes in species composition, density, and vigor, which can degrade spotted owl habitat characteristics over the long-term.

Effects on Mexican spotted owls from grazing by wild ungulates and domestic livestock are complex, and multiple factors may determine specific influences. These factors include local and regional climatic patterns, biotic community associations and ecology, soil types and conditions, and the timing, intensity, and duration of vegetation removal associated with the presence of grazing animals. Adding to the complexity are the interrelationships of grazing and other ecological processes, such as changes in herbaceous plant composition, woody vegetation structure, soil stability and ecology, and fire regimes.

Grazing has been proposed for all PACs during the breeding season with the proposed action. This could cause a direct effect to reproductive success with monitoring that has to be done with cattle to make sure they don't exceed utilization and to move cattle if utilization is exceeded while they are in the pasture. USFWS recommends the following conservation measures to avoid harassment of owls: where feasible, the Tonto NF shall avoid activities within 0.25 mile of PACs during the MSO breeding season (March 1 to August 31) that could result in disturbance to owls (USFWS 2012).

Grazing can adversely affect the owl primarily through four indirect effects:

- Diminished prey availability and abundance
- Increased susceptibility of habitat to destructive fires,
- Degradation of riparian and meadow plant communities, and
- Impaired ability of plant communities to recover or develop into more suitable spotted owl habitat.

These impacts are most likely to affect owls in certain geographic portions of the Colorado Plateau (CP), Southern Rocky Mountain (SRM), Upper Gila Mountain (UGM), and Basin and Range-East EMUs where individuals forage in or adjacent to grazed areas preferred by wild and domestic ungulates, including montane meadows, riparian corridors, or canyon bottoms (USFWS 2011).

Consistent moderate- to high-intensity grazing during the growing season reduces height and horizontal distribution of herbaceous plants that serve as protective cover and food sources for some of the owl's prey species, most notably voles (Peles and Barrett 1996). Reduction of herbaceous plant biomass may also influence the food of other prey species (e.g., white-footed mice; *Peromyscus* spp.) by removing or reducing the availability of plant seeds. Over time,

without sufficient opportunities for growing season biomass recovery and seed production within these plant communities, their ecological condition will not be maintained or improved and some sites may fall into a degraded ecological condition (Kothmann 2009). Where limited herbaceous cover and seed production persist in preferred owl foraging areas over several breeding seasons, reduction of prey availability can limit the energy intake of those owls, particularly when other prey species are concurrently limited. These conditions can contribute to reduced reproduction and declines in some owl populations (USFWS 2011).

In areas that are heavily grazed over long periods of time, reductions in herbaceous ground cover and increased density of shrubs and small trees can decrease the potential for beneficial low intensity ground fires while increasing the potential for destructive, high-intensity crown fires (Zimmerman and Neuenschwander 1994). Low-intensity ground fires prevent fuel accumulation, stimulate nutrient cycling, promote grasses and forbs, discourage shrubs and small trees, and perpetuate the patchiness that supports small mammal diversity, all indirectly or directly beneficial to owls. High-intensity crown fires reduce or eliminate foraging, wintering, dispersal, roosting, and nesting habitat components.

Excessive grazing in riparian areas can reduce or eliminate important shrub, tree, forb, and grass cover, all of which in some capacity support the owl or its prey. Unmanaged or poorly managed grazing of riparian plant communities can also physically damage stream channels and banks (Chaney et al. 1990). Deterioration of riparian vegetation structure can allow channel widening. This event, in turn, elevates water and soil temperatures and thus evaporation and lowering of water tables, as well as significantly increasing the potential for accelerated flood damage (Chaney et al. 1990). These processes alter the microclimate and vegetative development of riparian areas, potentially impairing its use by spotted owls. Prolonged use of these key habitats by large ungulates can alter plant reproduction and recruitment (e.g., cottonwoods, oaks), along with other negative habitat impacts including alteration of stream corridor morphology and hydrology, compaction of soil, and removal of stabilizing vegetation such as willows, sedges, and other native plants (Fleishner 1994). These impacts retard development of riparian, pine/oak, and other plant communities into habitat that can be used by owls for roosting, nesting, or dispersal. Where riparian areas act as refuges for small mammals during drought periods, the impacts of grazing also may influence future prey abundance.

Stand Condition (related to Mexican spotted owl (MSO) critical habitat):

Overall, where MSO protected activity centers (PACs) are located stand condition is excellent. There are large old growth Douglas fir and ponderosa pine with mix aged class groups. The understory is well developed and litter on the ground is ideal for MSO prey to hide, forage, and reproduce.

Forest Sensitive Species

Blumer's dock and Arizona bugbane are managed through a conservation agreement on Dagger Allotment. This agreement states that grazing will not occur within the watershed containing these plants. The watersheds where these plants are found are Workman Creek, Reynold's Creek, Coon Creek, and Cold Springs Canyon.

The proposed action would allow livestock grazing in watersheds containing these species, potentially causing an adverse effect. Populations of Blumer's dock being grazed often do not produce seeds. Continued grazing could eventually preclude the population's continued existence

due to a lack of seed production, compacted soils discouraging seedling establishment, trampling of plants and their creeping underground rhizomes, and destabilization of streambanks resulting in habitat loss (USFWS 1998).

There is a peregrine falcon active nest near Aztec Peak. All other sensitive species can be found within the analysis area, but they do not have population trend data.

Game Species (Harvest Emphasis Species)

Critical areas have been identified by Arizona Game and Fish Department for game species in this vegetation type. Critical areas are on Dagger and Chrysotile allotments and cover the entire vegetation type. These areas are critical for forage and production. Areas on Dagger Allotment have not been recently grazed and are recovering from the Coon Creek Fire. Sport fishing for rainbow and brown trout is popular within Workman Creek and Reynold's Creek.

Water Resources

There are a few unique water resources within this vegetation type. Edward's Spring is a montane wet meadow. This spring was developed historically, and it is also within an MSO PAC. Knowles Hole Spring is at the headwaters of Reynold's Creek and has aspen with montane riparian deciduous trees. Trailside Spring is at the headwaters of Coon Creek and has very dense riparian vegetation (willows, walnut, box alder, and sycamores) and has surface water. Cold Springs Canyon is on the eastern edge of the analysis and has a small spring at the top surround by old growth Douglas fir. Reynold's, Workman, Coon, and Ash Creek are perennial sources of water in the analysis area.

Summary

Habitat quality for this vegetation type is in good condition. Upper Oak Creek Mesa Pasture on Dagger Allotment has been in nonuse for approximately 15 years and has a large diversity of plants and animals. The Coon Creek Fire went through this area and the landscape is recovering. This area has benefited from no grazing that was brought on by protection of Blumer's dock and the Coon Creek Fire. Carol Pasture, Timber Pasture, Tony Pasture, and Horse Pasture on the Chrysotile Allotment are grazed.

Environmental Consequences - Alternative 1 (No Action)

Direct Effects

Overall direct effects to this vegetation type are small because the majority of this vegetation type is already protected from grazing.

Indirect Effects

Increased residual stubble height; increased recruitment of trees.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions in a shorter timeframe than other alternatives

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects

There are no direct effects of grazing currently with 6,100 acres in upper Oak Creek Mesa Pasture. This vegetation type could continue to improve from existing conditions. Approximately 2,300 acres on Chrysotile and Sedow allotments do not have any unique direct effects.

Indirect Effects

Continued yearlong grazing should have similar indirect effects as what was discussed in general effects caused by alternative 2, 3, and 4.

Cumulative Effects

Direct and indirect effects of this alternative when combined with other past, present, and future conditions may lead to desired future conditions, but at a slower rate than alternatives 1 and 4. This is due to the fact that 2300 acres would still be grazed on Chrysotile and Sedow allotments.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects

Direct impacts to grazing on Arizona bugbane and Blumer's dock.

Increasing cattle numbers within the analysis area could have magnified impacts on the land when compared with current management. Direct impacts could increase with increasing number of cattle throughout the analysis area.

Indirect Effects

Loss of habitat for MSO prey; decrease in structural diversity; increased impacts on MSO and Chiricahua leopard frog; impacts on new recruitment of tree species.

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may not lead to desired future conditions

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

Direct Effects

Approximately 2,300 acres currently being used could have fewer impacts than alternative 3, because of seasonal grazing.

Indirect Effects

Habitat quality for wildlife should show an upward trend with seasonal winter grazing

Cumulative Effects

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, may lead to desired future conditions within the same time frame as alternative 1.

Effects of vegetation management tools

Grazing and browsing above conservative use levels: projected downward trend in habitat quality because food and cover for wildlife would be removed and habitat would be altered. Effects increase as utilization increases.

High intensity short duration grazing would result in downward trend in habitat quality to a level where all or most of wildlife habitat is removed. The extent of effects would be greater as the area it is applied to increases, and the duration of effect and any recovery from effects would be related to frequencies the treatments are applied.

Fencing and herding: effects are similar to those described for chaparral.

Water developments to improve livestock distribution: effects are similar to those described for chaparral.

Erosion control structures: see tools effects for Sonoran Desert.

Seeding and planting of native vegetation: effects are similar to those described for chaparral.

Placement and density of salt or low moisture blocks: see tools effects for Sonoran Desert.

If *noxious weed treatment* is implemented, effects would be similar to those described for chaparral.

Timber and fuel wood sales for tree density management: Neutral to upward trend in habitat quality. Effects depend on aspect, slope, and type of prescription used for area, based off soil composition and ability of area to recover plant diversity. Using treatment methods in conjunction with prescribed fire and deferred grazing would have greatest benefits. These treatments could potentially affect Mexican spotted owl and goshawk habitats. Using optimum canopy cover requirements for forest dependent wildlife may mitigate effects. As size and intensity of treatments increase, effects would generally increase.

Fuels reduction through prescribed fire and mechanical methods: Overall upward trend in habitat quality, but short-term effects on individuals of many species are possible depending on treatment design, extent, and timing. Fuel reduction treatments would have short term effects and long-term benefits for many species. Effects would be dependent on treatments design and can be minimized by following species recovery plans, conservation measures, and forest plan standards, guidelines, critical habitat guidelines, and amendments. Treatments would generally be most effective, when combined with some deferral of grazing before and after treatment.

Existing Condition and Effects Analysis- Riparian

Existing Condition below 4,000 feet

There are 374 miles of named streams with riparian habitats within the project area. Streams below 4,000 feet elevation include Upper Salt River, Cherry Creek, and Ash Creek. The project riparian areas and stream channels report estimate that there appears to be as many unnamed streams as named streams, for a total estimate of 748 miles of streams within the project area. Unnamed streams would include primarily tributaries to main streams and can be expected to be generally intermittent streams, and washes (also called ephemeral or xeric riparian).

In 1985, Tonto Forest Plan information was used to estimate that forestwide there were 4,243 acres of forested low-elevation riparian habitat and 26.904 acres of riparian habitats dominated by vegetation below the tree layer (scrub and/or tree regeneration). More recent information for the project area estimating acres of riparian habitat and describing existing vegetation is not currently available, but general information is known from riparian biotic community descriptions, key stream reach information, photos, and observations.

Riparian biotic communities that currently occur within the project area below 4,000 feet elevation include Sonoran Riparian Deciduous Forest and Woodlands, Interior Riparian Deciduous Forest and Woodlands, and Riparian Scrublands. The best example of remaining Sonoran Riparian Forest occurs on Cherry Creek from its confluence with the Upper Salt River to about 4 to 5 miles upstream. Reaches of Interior Riparian Forest occur at upper elevations approaching 4,000 ft. along Ash, Coon, and Pinal creeks, and near Sycamore Spring, but occur more frequently within high elevation riparian habitats. Riparian Scrubland vegetation, including tamarisk, covers many acres of floodplains under 4,000 feet including most of Upper Salt River floodplain, and reaches of Ash and Cherry creeks, Hess Canyon, and others.

In addition to dominating most of the Upper Salt River floodplain, tamarisk occurs throughout almost all stream channels even the smallest dry washes, where it has been observed growing alongside cottonwood seedlings. Native mid-story and understory vegetation such as willow and riparian grasses, sedges, and rushes occur as minor components or inclusions within numerous drainages, which are now dominated by complexes of nonnative and upland vegetation. Many unnamed stream channels have little or no vegetative cover due to many factors, especially their use by vehicles as routes and play areas, but also upland watershed conditions and frequent flooding.

In general, native tree-shrub vegetation is higher quality wildlife habitat for more species than riparian scrub vegetation, but not at all locations, and not for all species. For example, Southwestern willow flycatcher nesting success is similar in native riparian vegetation and tamarisk (USGS 2008). In addition, up to 49 species of birds have been observed nesting in tamarisk vegetation across the western United States (Paxton et al. 2007, Sogge et al. 2008).

Stressors currently affecting low elevation riparian habitats in the project area include drought and flooding, which are stressors resulting from natural processes, and stressors resulting from human influences including recreation, invasive species, water diversions, upstream groundwater pumping, livestock grazing, and vehicle use, roads, and routes.

Table 14: Plant and Animal Species of Concern

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
Southwestern Willow Flycatcher (E, CH, PCH)	Allen's Lappet-Browed Bat	Bald Eagle	Southwestern Willow	American Black Bear	Arizona Toad
Yellow-billed Cuckoo (C)	California Leaf-nosed Bat	Bell's Vireo	Bald Eagle	Mule Deer	Western Red Bat
Yuma Clapper Rail (E)	Greater Western Mastiff Bat	Summer Tanager	Yellow-billed Cuckoo (C)	Mourning Dove	Allen's Lappet-Browed Bat

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
Northern Mexican Garter snake	Pale Townsend's Big-eared Bat	Hooded Oriole	Yuma Clapper Rail (E)	White-winged Dove	Southwest River Otter
	Western Red Bat		Yellow Warbler	Gambel's Quail	Bald Eagle
	Pocketed Free-tailed Bat		Northern Beardless-Tyrannulet	Mountain Lion	Sonora Mud Turtle
	Spotted Bat		Common Black-Hawk	Bobcat	California Leaf-nosed Bat
	White-nosed Coati		Phainopepla	Mearn's Quail	
	Rocky Mountain Bighorn Sheep		Lucy's Warbler	Javelina	
	Common Black-hawk		Costa's Hummingbird	Rocky Mtn. Bighorn Sheep	
	Western Yellow-billed Cuckoo		Bell's Vireo		
	Bald Eagle				
	American Peregrine Falcon				
	Northern Gray Hawk				
	Zone-tailed Hawk				
	Abert's Towhee				
	Reticulate Gila monster				
	Lowland Leopard Frog				
	Arizona Toad				
	Pima Indian Mallow				
	Galiuro Sage+				
	Mt. Dellenbaugh Sandwort				
	Arivaipa Woodfern				
	Cochise Sedge				

+ Species listed in both high and low elevation riparian vegetation categories where they are known to occur within both elevation ranges within the project area.

Federally Listed and Candidate Species

Southwestern willow flycatcher (SWWF) occurs within the project area in riparian habitats along Salt River, Cherry Creek, and the east end of Roosevelt Lake; it also occurs on private land on Pinal Creek upstream and adjacent to the project area. Critical habitat occurs along 18 river miles of Upper Salt from Diversion Dam, downstream of SR 288 Bridge near the river's confluence with Roosevelt Lake upstream to its confluence with Cherry Creek. Critical habitat acreage is estimated at 2,060 acres, which occurs within the one hundred year floodplain. Salt River upstream from Roosevelt Lake is a free-flowing river above the diversion dam. Breeding habitat along the river currently consists primarily of mixed exotic-native riparian vegetation dominated by tamarisk with small developing inclusions of cottonwood-willow vegetation.

Cherry Creek from its confluence with the river upstream for about four to five miles is mixed native-exotic flycatcher habitat and has reaches where the primary floodplain has good stands of native cottonwood-willow habitats occupied by flycatchers.

Roosevelt Lake has one of the largest breeding SWWF populations within the range of the species and is the largest population on National Forest lands. Habitat patches on the river that have been occupied between 2007 and 2012 include Horseshoe Bend, Chalk-Coon Creek, Cherry Creek, and Gleason Flat. They occurred in mixed exotic/native, exotic, native and mixed native/exotic, and exotic vegetation, respectively. Small numbers of cowbirds have been detected along the river at Horseshoe Bend and Gleason Flat. They were also detected in small numbers or singly during the Cherry Creek Surveys. Several other Empidonax flycatchers were observed during 2011 flycatcher surveys, but they remained unidentified, because they did not respond with the correct call to the survey broadcast recording.

Cattle management activities have the potential to affect riparian habitat within allotments and watersheds. Sediment inflows from project area allotments may affect designated flycatcher critical habitat in Salt River and proposed habitat in Pinal Creek

Consideration of uplands is essential. Elmore and Kaufman (1994) reported that "simply excluding the riparian area (from grazing) does not address the needs of the upland vegetation or the overall condition of the watershed. Unless a landscape-level approach is taken, important ecological linkages between the uplands and aquatic systems cannot be restored and riparian recovery will likely be limited." Livestock grazing may alter vegetation composition of the watershed (Popolizio 1994). It may cause soil compaction and erosion, alter soil chemistry, and cause loss of cryptobiotic soil crusts (Orodho et al. 1990). Cumulatively, these alterations contribute to increased erosion and sediment input into streams (Wood 1986). They also contribute in changes to infiltration, water holding capacity of the watershed, and runoff patterns, thus increasing the volume of flood flows while decreasing their duration (Gifford and Hawkins 1978). As a result, groundwater levels may decline and surface flows may decrease or cease (Kovalchik and Elmore 1992).

The proposed action may have significant effects on the Southwestern willow flycatcher and critical habitat with proposed use of the Upper Salt River, Roosevelt Lake, and other riparian areas including Cherry, Coon, and Pinal creeks. Other alternatives would have fewer effects on flycatchers and their habitats.

Small amounts of habitat at the eastern end of Roosevelt Lake and along Salt River could be potentially suitable habitat for the Yuma clapper rail, but this species has not been observed in either of these areas and is not expected to occur within the project area. It has been observed near the west end of Roosevelt Lake and is one of four species included in the Roosevelt Lake Multi-species Conservation Plan.

Yellow-billed cuckoo occurs along the river and Cherry Creek within the project area during the breeding season. This species is proposed for listing and inhabits similar habitat patches as the Southwestern willow flycatcher. There have been observations of yellow-billed cuckoo on allotments along nearby Tonto Creek. Cattle management activities have the potential to affect riparian habitat in the watershed.

Potentially suitable habitat for the northern Mexican garter snake occurs along the river, Cherry Creek, lower reaches of Ash Creek, and reaches of Pinal Creek. They have also been found at springs and stock tanks in other parts of their range. This species may not currently occupy habitats in the project area primarily because a variety of non-native predatory species are present.

These snakes are semi-aquatic, and activities that negatively affect stream morphology and the snakes' prey will also negatively affect these snakes. Both species of garter snakes require permanent water, dense streamside vegetation and soft-rayed fish. In particular, the narrow-headed garter snake also requires a rocky stream bottom (Holycross et al. 2006). Non-native fish, crayfish and bullfrogs prey upon and out-compete northern Mexican garter snakes, thus leading to a decline in the species (USFWS 2008). NatureServe (2008) also lists the introduction of non-natives and the loss of habitat as major threats to narrow-headed garter snakes. Brennen and Holycross (2006) suggest that grazing and wildfires may affect narrow-headed garter snakes via erosion of stream banks, loss of aquatic vegetation, and increasing sedimentation, which covers rocky foraging sites. The northern Mexican garter snake is listed as threatened throughout Mexico and is believed extirpated from New Mexico and has declined in Arizona (USFWS 2008). NatureServe (2008) states that the United States' populations of narrow-headed garter snakes appear moderately threatened. In light of recent declines, the U.S. Fish and Wildlife Service (2008) issued a news release stating it would revisit whether the northern Mexican garter snake warrants protection under the Endangered Species Act.

Surveys conducted in 2005 and 2006 in Arizona by Game and Fish found 16 Mexican garter snakes between Gisela and "The Box" on Tonto Creek (Holycross et al. 2006). One narrow-headed garter snake was located in Tonto Creek just above the confluence of Gun Creek (Holycross et al. 2006). A population of narrow-headed garter snakes was documented in 1988 at the Gun Creek confluence with Tonto Creek (Holycross et al. 2006). There is an historical voucher for a northern Mexican garter snake near Tonto Creek, north of Punkin Center from 1995 (Holycross et al. 2006). Sustaining habitat for these species is important not only to these populations themselves, but as a possible source for extirpated populations in other drainages (NatureServe 2008).

Well-managed grazing can occur with limited effects to this species when the presence or absence of nonnative species is considered, and management emphasis is directed towards limiting some access to riparian and aquatic habitats within occupied habitat. These actions, combined with management that disperses livestock away from riparian areas, reduce the threats of livestock grazing on northern Mexican garter snakes and their habitats (USFWS 2008). Szaro, et al. (1985)

assessed the effects of improper livestock management on a sister taxon. They found that western (terrestrial) garter snake (*Thamnophis elegans vagrans*) populations were significantly higher (versus controls) in terms of abundance and biomass in areas that were excluded from grazing, where the streamside vegetation remained lush, than where uncontrolled access to grazing was permitted. Preliminary garter snake survey data from Burger (2007) from the States of Durango and southern Chihuahua, Mexico, indicate that the northern Mexican garter snake is less susceptible to population impacts associated with physical disturbances to its habitat, such as livestock grazing, when the biotic community is comprised of wholly native species.

Each alternative would have a different effect on this species.

The proposed action would be the least beneficial for the garter snake. Cattle would be able to graze riparian areas. Additionally, soil conditions would recover more slowly with this alternative relative to alternative 1. Development of waters could be an undesirable effect as they can introduce non-natives.

Alternative 1 would be the most beneficial for the species, as eliminating grazing would eliminate detrimental effects caused by grazing in riparian areas and facilitate recovery of impaired upland soils.

Alternative 2 has some benefits to this species within the Sonoran Desert community. This alternative would allow for the desert to recover slowly and beneficial effects to riparian would happen at a slower rate than alternative 1.

Forest Sensitive Species

Twenty-four sensitive species are listed as occurring in riparian habitats below 4,000 feet. Twelve of these species are found in riparian habitat most or all of the time, while eight others generally depend on riparian habitats for some key life cycle functions. Two others were included because they are observed repeatedly within the Salt River floodplain.

A summary analysis for each sensitive species with an accompanying determination and rationale is being prepared in the project biological evaluation. When needed, conservation measures will be included to minimize effects on a sensitive species.

Game Species (Harvest Emphasis Species)

In healthy riparian habitats, abundant food water and cover is available in the same area for herbivores. For predators, availability of some species of prey may be higher in riparian habitats. Rocky mountain bighorn sheep are frequently observed in and near the Salt River floodplain, especially where the river is near adjacent escape cover. Mule deer are known to be hunted along the river corridor. Bear, mountain lion, and bobcat are observed occasionally. Bear and lion hunters hunt in areas near the river to some extent. Browse and herbaceous forage may be limited in some habitat patches along the river because of the dominance of tamarisk vegetation.

Water Resources

Many springs, seeps, stock tanks, and livestock water troughs are present below 4,000 feet in the project area. Many springs and a few stock tanks have riparian vegetation and can be important wildlife habitats.

Stock tanks and water troughs generally provide available water and have some habitat value for some wildlife species, especially if they are designed and constructed to be wildlife friendly.

Bats, big game, and some birds are species most likely to use livestock water developments. Accessible springs and seeps unprotected from livestock grazing generally have low habitat quality. Recreation activities including road use can also reduce habitat quality at water sources.

Management Indicator Species (MIS)

Four MIS were selected during forest planning (1985) as indicators of components or features within low elevation riparian habitats. They are bald eagle, Bell's vireo, summer tanager, and hooded oriole. They were chosen to indicate, general riparian, well-developed understory, tall mature trees, and medium sized trees, respectively. An MIS report will be prepared for this project, which will estimate if and how much this project will affect forestwide habitat and population trends for each MIS.

Migratory Birds

Eleven species were selected from the Tonto NF migratory bird species of concern list from the Sonoran riparian deciduous and woodlands, Sonoran riparian scrublands, and the Marshlands vegetation categories, which follow Arizona Breeding Bird Atlas habitat descriptions (appendix C). All of these species have been observed in the project area except the northern beardless Tyrannulet. Migratory birds will be analyzed in a project Migratory Birds Report.

Summary

The Upper Salt River floodplain riparian habitats may be near desired conditions for Southwestern willow flycatchers and some other species, but dominant tamarisk vegetation provides low habitat quality for many species. Interior Riparian Deciduous Forest and woodlands, springs and seeps, and riparian scrublands may have low habitat quality in many reaches, especially where terrain is gentle, due to a variety of stressors caused by human influences and natural processes.

Existing Condition above 4,000 feet

In 1985, it was estimated that there were 5,782 acres of high elevation riparian areas above 3,500 ft. in riparian structural types I-III (with tree canopy) and 4,450 acres in structural types VI-VI (vegetation primarily below the tree layer – shrubs and tree regeneration). Primary biotic communities in high elevation riparian habitats include montane riparian forest at higher elevations, and Interior Broadleaf Deciduous Riparian Forest and Woodlands at mid-elevations (Brown 1994). Montane riparian forests have high elevation riparian species such as narrow-leaf cottonwood, but also include elements of surrounding conifer forest overstory, mid-story, and understory habitat layers. Interior Broadleaf Riparian Deciduous Forest and woodland stream reaches in this project area generally have a canopy with sycamore and one or more additional Arizona riparian trees in the overstory. Mid-story and understory species vary greatly and can include tree regeneration, various shrubs, and deciduous vines depending on past and current land management practices and natural processes.

Examples of Montane Riparian Forest habitats on Tonto Basin Ranger District include headwater of Reynold's, Oak, Deep, and Coon creeks. Upper elevations of Ash Creek are the only substantial Montane Riparian Forest vegetation in the project area within Globe Ranger District. Existing, active stressors on Montane Riparian forest habitats include unnaturally intense wildfires, roads, routes and trails, local water diversions, livestock and wildlife grazing, and invasive species. Upper elevations of Oak Creek Mesa Pasture on Tonto Basin Ranger District have not had livestock grazing in roughly 15 years. Stressors on Interior Deciduous Riparian Forests include climatic factors, local water diversions and upstream rural water developments

and groundwater pumping, livestock grazing and related water developments and infrastructure, roads, recreation, and invasive species. Montane riparian vegetation has apparently retained the most overall wildlife habitat quality of riparian habitats in the project area. They generally have narrow, steep valley bottoms with V-shaped channels, more perennial flows and fewer active stressors than their mid- and lower-elevation counterparts. They can provide substantial amounts of food water and cover for higher elevation wildlife species. Interior riparian deciduous forest and woodland riparian habitats currently generally provide low habitat quality because in many drainages because they have more active natural and human caused stressors on the landscape including climate factors, easier access, OHVs and other recreation, invasive species, and livestock grazing.

Table 15: Plant and Animal Species of Concern

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
Mexican Spotted Owl	Allen's Lappet-Browed Bat	Hairy Woodpecker	Black Hawk+	Elk	Allen's Lappet-Browed Bat
Chiricahua Leopard Frog	Pale Townsend's Big-eared Bat	Arizona Gray Squirrel	Yellow warbler	Mule Deer	Western Red Bat
	Greater Western Mastiff Bat	Warbling Vireo	Cordilleran Flycatcher	Coues White-tailed Deer	Desert Purple Martin
	Spotted Bat	Western Wood Pewee	Red-faced Warbler		American Dipper
	Western Red Bat	Black Hawk	MacGillivray's warbler	Arizona Gray Squirrel	Chiricahua Leopard Frog
	Common Blackhawk+		Red-naped sapsucker	Merriam's Turkey	Arizona Toad
	American Peregrine Falcon			Mountain Lion	Lowland Leopard Frog+
	Zone-tailed Hawk+			American Black Bear	Arizona Gray Squirrel
	Narrow-headed Garter snake			Bobcat	Mexican Spotted Owl
	Lowland Leopard Frog+				Pacific Wren
	Arizona Toad				Arizona Bell's Vireo
	Arizona Bugbane				
	Blumer's Dock				

Federal	Forest Sensitive	MIS	Migratory Birds	Game Species	SGCN (AZGFD)
	Eastwood Alum Root				
	Galiuro Sage+				
	Mt. Dellenbaugh Sandwort				
	Chihuahuan Sedge				
	Cochise Sedge				

+ *Species listed in both high and low elevation riparian vegetation categories where they are known to occur within both elevation ranges within the project area.*

Federally Listed Species

Montane riparian forest vegetation generally occurs within a surrounding upland conifer forest matrix. In upper Oak Creek Mesa Pasture, above roughly 5,300 feet elevation, mixed conifer and pine vegetation supports eight Mexican spotted owl (MSO) protected Activity Centers (PACs). MSO critical habitat in the project area is within the Basin and Range West Recovery Unit near its boundary with the southernmost portion of the Upper Gila Mountains Recovery Unit and covers roughly 13,800 acres.

Riparian forests are an important vegetation type for MSO nesting, roosting, and foraging habitats and provide Primary Constituent Elements of critical habitat. Nesting and roosting habitats are a limiting factor for MSO across its range (USFWS 2011, Biological Opinion for Tonto NF Forest Plan). One MSO PAC occurs on the Globe Ranger District along upper Ash Creek in Pine-Arizona Oak vegetation; it is not within designated critical habitat. Montane riparian habitats in upper Oak Creek Mesa Pasture appear to be at or near desired conditions. Key reaches of Zimmerman, Oak, Reynold's, and upper Coon creeks are either in stable condition or have not been assessed, and all have riparian vegetation. Fire risk appears to be low to medium and upper elevations of Oak Creek Mesa Pasture have not been grazed by livestock in more than 15 years. The Ash Creek PAC is affected by more stressors and appears farther from desired conditions. Existing active stressors include OHVs and other recreation, livestock grazing, road, route and highway effects, private land inholdings, and unnaturally intense wildfire.

Chiricahua leopard frogs (CLF) could exist within the project area in streams, springs and stock tanks above 4,800 feet elevation. The most likely areas for the frog to occur are in Ash Creek on the Chrysotile Allotment, and within Oak Creek Mesa Pasture of the Dagger Allotment. Surveys for CLF have not been conducted in the Oak Creek Mesa Pasture. Ash Creek and other riparian habitats in its vicinity were last surveyed in 2008 due to nearby historical records, and no frogs were detected.

Potentially suitable CLF habitats on the Globe District have low habitat quality due to stressors including Chitrid fungus (Ash Creek), livestock grazing, drought, illegal fish stockings, and nonnative fish, amphibians, and invertebrates.

Effects of livestock grazing on leopard frog populations are not well-studied. Livestock are adapted to mesic habitats and select riparian habitats for water, shade, and cooler temperatures.

They spend a disproportionate amount of their time in riparian zones and can adversely affect these systems in a number of important ways (Belsky et al. 1999).

Livestock grazing is nearly ubiquitous within the historical range of the frog. The CLF coexists with grazing activities at most sites where it is found. Stock tanks, constructed as water sources for livestock, are important habitat for CLF, particularly in Arizona (Sredl 1998). In some areas, stock tanks replaced natural springs and cienegas or were developed at spring headwaters or cienegas and now provide the only suitable habitat available to the frog. In Arizona, (Sredl 1998) found a significantly higher proportion (62 percent) of known extant populations in stock tanks as compared to those in riverine habitats (35 percent), suggesting Arizona populations of this species have fared better in stock tanks than in natural habitats.

However, this generalization does not hold for New Mexico, where in recent years many stock tank populations were extirpated, apparently by disease (Jones 2005). Sredl (1998) found that stock tanks in Arizona are occupied less frequently by non-native predators (with the exception of American bullfrogs) than natural sites. For all these reasons, there is a high probability that CLF would be extirpated from many more areas if ranchers had not built and maintained stock tanks for livestock production.

Although stock tanks provide refugia for frog populations and are important for this species in many areas, only small populations are supported by such tanks and these habitats are very dynamic and lack habitat complexity. Tanks often dry out during drought, and flooding may destroy downstream impoundments or cause siltation, either of which may result in loss of aquatic communities and extirpation of frog populations. Construction of tanks may destroy natural habitats at or downstream of the tank, and may alter local hydrology. Periodic maintenance to remove silt from tanks may also cause a temporary loss of habitat and mortality of frogs. Populations of non-native introduced predaceous fishes, American bullfrogs, and other species, although less prevalent than in natural habitats, sometimes become established in stock tanks and are implicated in the decline of CLF (USFWS 2011).

Stock tanks may facilitate spread of infectious disease and non-native aquatic organisms by providing aquatic habitats in arid landscapes that otherwise may have served as barriers to the spread of such organisms. Most stock tanks do not provide suitable breeding habitat because they do not regularly hold water long enough for development of larvae to metamorphosis. Sredl cautions that stock tank populations are sometimes simply mortality sinks with little reproduction or recruitment (1998).

Other adverse effects to the species and its habitat may occur under certain circumstances as a result of livestock grazing activities (Sredl and Jennings 2005). These effects include trampling of eggs, tadpoles, and frogs; deterioration of watersheds; erosion and/or siltation of stream courses; elimination of undercut banks that provide cover for frogs; loss of wetland and riparian vegetation and backwater pools; and spread of disease and non-native predators (Belsky et al. 1999).

Increased watershed erosion caused by grazing can accelerate sedimentation of deep pools used by frogs (Grunderson 1968). Sediment can alter primary productivity and fill interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal. Eggs, tadpoles, metamorph frogs, and frogs hibernating at the bottom of pools or stock tanks have the potential to be trampled by cattle (USFWS 2002).

Southwestern willow flycatchers have not yet been detected in higher elevation riparian habitats on the Tonto NF. Few potentially suitable habitats appear to be present, and none has been surveyed recently. Because of the large flycatcher population at Roosevelt Lake, flycatchers may use high elevation drainages in the project area for migrating and non-breeding habitats. There may be a few reaches that could be potentially suitable high elevation breeding habitats.

Forest Sensitive Species

Eighteen sensitive species are listed as species of concern in high elevation riparian habitats and other sensitive species also use these habitats. Some species such as the peregrine falcon are known to occur in the project area, while others are listed because habitat they occupy in other parts of their range is present in the project area, and no recent local surveys have been conducted. Blumer's dock and Arizona bugbane are two sensitive plants that occur in upper elevation riparian habitats within Oak Creek Mesa Pasture of Dagger Allotment. These species have conservation agreements with recommendations that kept them from being federally listed in the 1990s. Threats to sensitive species from land management activities vary by species, but can include fire, recreation, livestock grazing, invasive species, and roads.

Overall wildlife habitat quality varies by drainage and stream reach. Generally, habitat quality in upper elevation, riparian reaches in streams in Oak Creek Mesa Pasture of Dagger Allotment appear to have good to excellent habitat quality with a few reaches with lower habitat quality. Habitat quality on the Globe Ranger District appears to be lower, more variable, with more active threats.

Game Species (Harvest Emphasis Species)

Many game species seasonally use high elevation riparian areas primarily during summer, but also spring and fall. Riparian habitat can provide abundant forage, escape cover, and water for elk and deer. Elk can locally overgraze high and mid-elevation riparian habitats in some locations. Predators such as bobcats may find abundant numbers of prey species in riparian habitats. Game and other species also use drainages as movement corridors. Ash Creek on Globe Ranger District is a movement corridor for black bear, which are frequently observed along higher elevations of that drainage.

Management Indicator Species (MIS)

Five species were selected during forest planning (1985) as indicators of components or features within high elevation riparian habitats. They are hairy woodpecker, Arizona gray squirrel, warbling vireo, western wood pewee, and black hawk. They were chosen to indicate, snags and cavities, general riparian conditions, a tall overstory, a medium overstory, and riparian streamside, respectively.

An MIS report will be prepared for this project, which will estimate if and how much this project will affect forestwide habitat and population trends for each MIS.

Water Resources

Many springs, seeps, stock tanks, and livestock water troughs are present above 4,000 in the project area. Many springs and a few stock tanks have riparian vegetation and can be important wildlife habitats.

Stock tanks and water troughs generally provide available water and have some habitat value for some wildlife species, especially if they are designed and constructed to be wildlife friendly.

Bats, big game, and some birds are species most likely to benefit from livestock water developments.

Migratory Birds

Six species were selected from the Tonto NF migratory bird species of concern list to be evaluated (appendix C). These species have either been observed, or have suitable habitats that occur in the project area. They will be evaluated in a project migratory bird species report.

Summary

Overall habitat quality in riparian habitats greater than 4,000 feet in elevation is generally high in many drainages at higher elevations with montane riparian forest habitats, but lower, and in some cases low, in more mid-elevation drainages with Interior Riparian Deciduous forest and woodland, and riparian scrub biotic communities. These mid-elevation riparian habitats appear to have more stressors, both anthropogenic and human caused, which occur over larger areas, for longer time periods, with longer recovery periods.

Fisheries Existing Condition

Table 16: Fish Species Present in the Salt River

Common Name	Scientific Name	Nativity	Status
Largemouth Bass	<i>Micropterus salmoides</i>	Nonnative	Common
Smallmouth Bass	<i>Micropterus dolmieu</i>	Nonnative	Common
Flathead Catfish	<i>Pilodictis olivaris</i>	Nonnative	Common
Channel Catfish	<i>Ictalurus punctatus</i>	Nonnative	Common
Red Shiner	<i>Cyprinella lutrensis</i>	Nonnative	Common
Fathead Minnow	<i>Pimephales promelas</i>	Nonnative	Common
Carp	<i>Cyprinus carpio</i>	Nonnative	Common
Green Sunfish	<i>Lepomis cyanellus</i>	Nonnative	Common
Bluegill	<i>Lepomis macrochirus</i>	Nonnative	Common
Mosquito fish	<i>Gambusia affinis</i>	Nonnative	Common
Desert Sucker	<i>Catostomus clarki</i>	Native	USFS Sensitive
Sonoran Sucker	<i>Catostomus insignis</i>	Native	USFS Sensitive
Longfin Dace	<i>Agosia chrysogaster</i>	Native	USFS Sensitive
Speckled Dace	<i>Rhinichthys osculus</i>	Native	Declining
Roundtail Chub	<i>Gila robusta</i>	Native	USFWS Candidate
Razorback Sucker	<i>Xyrauchen texanus</i>	Native	USFWS Endangered
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Native	USFWS Endangered

Table 17: Fish species present in Pinal Creek

Common Name	Scientific Name	Nativity	Status
Largemouth Bass	<i>Micropterus salmoides</i>	Nonnative	Common
Smallmouth Bass	<i>Micropterus dolmieu</i>	Nonnative	Common
Flathead Catfish	<i>Pilodictis olivaris</i>	Nonnative	Common

Common Name	Scientific Name	Nativity	Status
Channel Catfish	<i>Ictalurus punctatus</i>	Nonnative	Common
Red Shiner	<i>Cyprinella lutrensis</i>	Nonnative	Common
Fathead Minnow	<i>Pimephales promelas</i>	Nonnative	Common
Carp	<i>Cyprinus carpio</i>	Nonnative	Common
Green Sunfish	<i>Lepomis cyanellus</i>	Nonnative	Common
Bluegill	<i>Lepomis macrochirus</i>	Nonnative	Common
Mosquito fish	<i>Gambusia affinis</i>	Nonnative	Common
Desert Sucker	<i>Catostomus clarki</i>	Native	USFS Sensitive
Sonoran Sucker	<i>Catostomus insignis</i>	Native	USFS Sensitive
Longfin Dace	<i>Agosia chrysogaster</i>	Native	USFS Sensitive
Speckled Dace	<i>Rhinichthys osculus</i>	Native	Declining

Table 18: Fish Species present in Pinto Creek

Common Name	Scientific Name	Nativity	Status
Green Sunfish	<i>Lepomis cyanellus</i>	Nonnative	Common
Desert Sucker	<i>Catostomus clarki</i>	Native	USFS Sensitive
Longfin Dace	<i>Agosia chrysogaster</i>	Native	USFS Sensitive

Table 19: Fish species present in Ash Creek

Common Name	Scientific Name	Nativity	Status
Desert Sucker	<i>Catostomus clarki</i>	Native	USFS Sensitive
Sonoran Sucker	<i>Catostomus insignis</i>	Native	USFS Sensitive
Longfin Dace	<i>Agosia chrysogaster</i>	Native	USFS Sensitive
Speckled Dace	<i>Rhinichthys osculus</i>	Native	Declining
Roundtail Chub	<i>Gila robusta</i>	Native	USFWS Candidate

Table 20: Fish species present in Coon Creek

Common Name	Scientific Name	Nativity	Status
Desert Sucker	<i>Catostomus clarki</i>	Native	USFS Sensitive
Longfin Dace	<i>Agosia chrysogaster</i>	Native	USFS Sensitive

Environmental Consequences - Alternative 1 (No Action)

Direct Effects

Disturbance, displacement, or mortality to individual animals such as ground or shrub nesting birds, or avoidance of habitats would not occur from implementing this alternative because grazing and livestock management activities would not take place.

Indirect Effects

Riparian wildlife habitats would not be altered by grazing or livestock management activities therefore there would be no effects on habitats individuals or species. Recovery rates of riparian habitats would be variable as described in hydrology and riparian environmental consequences section. In general, implementing this alternative would provide for the most rapid rates of

recovery for riparian wildlife habitats because forage, cover, and water, major components of wildlife habitat, would no longer be removed annually by livestock. Riparian wildlife habitats along entire drainages could recover throughout the analysis area to meet desired conditions.

Implementing alternative 1 would be most likely to meet the highest number of desired future conditions for riparian wildlife species and habitats at the fastest rate. Livestock grazing would not occur along the upper Salt River drainage or tributaries to it, or at springs. Overall riparian wildlife habitat quality would be expected to be the highest of the four alternatives. For a few species habitat quality could be lower if this alternative were implemented.

Cumulative Effects

Implementing this alternative would not contribute any added project effects to other past, present or reasonably foreseeable actions (cumulative effects).

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects

These effects can include mortality and disturbance. For example, livestock can trample nests of ground nesting birds and dislodge nests of shrub-nesting birds causing displacement, poor condition, and mortality of individuals. Disturbance can include a variety of livestock management activities such as branding and shipping, which can cause displacement and avoidance of areas by wildlife. Avoided areas may include important habitats for nesting, roosting, feeding, and watering.

Indirect Effects

Livestock grazing effects would be somewhat similar to effects described in more detail for alternative 3. In summary, effects would include reducing or removing food, water, and cover otherwise available for wildlife, altering habitat structure or plant species composition, and reducing or precluding riparian habitat development. Implementing alternative 2 would continue ongoing management. Under this alternative 50 key riparian stream reaches and 154 existing springs would be continue to be grazed. The Upper Salt River floodplain would continue to be excluded from most grazing. Incidental grazing occurs in areas where fences and natural barriers do not fully protect the river from livestock access or fences are cut or gates left open by forest users.

Overall riparian wildlife habitat quality was evaluated for 65 key riparian stream reaches and was estimated to be moderately declining along 45 of these key reaches. Primary reasons for expected continuing declines in habitat quality include the presence of livestock water developments, corrals, or other range infrastructure in or adjacent to key reaches, and/or descriptions of heavy use, trampling, and/or trailing reported during monitoring. Implementing this alternative appears unlikely to meet desired future conditions for riparian wildlife habitat quality in many riparian areas.

Cumulative Effects

Cumulative effects can be common to more than one resource and alternative. Cumulative actions, which could affect wildlife species and habitats, are similar to those described in the hydrology and riparian environmental consequences discussion. In summary, they include historic overgrazing, mining, Cherry Creek water diversion, and potentially other upstream water diversions, unauthorized livestock grazing, tamarisk, recreation activities, roads and highways, fire and timber management activities, rural subdivision development, and climate change. For

alternative 2, most of the action effects are already occurring and are expected to continue at or near existing levels if this alternative is implemented. Therefore any action effects from this alternative would have minimally additive effects to overall cumulative effects.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects

These effects can include mortality and disturbance. For example, livestock can trample nests of ground nesting birds and dislodge nests of shrub-nesting birds causing displacement, poor condition, and mortality of individuals. Disturbance can include a variety of livestock management activities such as branding and shipping, which can cause displacement and avoidance of areas by wildlife. Avoided areas may include important areas for nesting, roosting, feeding, and watering.

Indirect Effects

Grazing may reduce vegetation growth and litter cover. Litter encourages plant recovery after drought because it traps seeds and lowers evaporative loss (Milchunas 2006). Seeds and subsequent plants provide wildlife with food, nesting sites, and cover. Livestock consume and trample vegetation, which may lead to potentially reducing establishment of additional vegetative cover, reduced vegetation density, reduced ground cover, and changes in plant species composition. Grazing may change the structure of vegetation making it less suitable as habitat for nesting, roosting, foraging, and use as escape and thermal cover. Changes in habitat structure resulting from grazing may fragment habitats. Livestock trailing through habitats may facilitate cowbird parasitism and predation by making it easier for predators and cowbirds to locate bird nests. Grazing contributes to drying of riparian floodplain habitats by trampling soils and streambanks, altering plant species composition, and livestock drinking water from shallow floodplain pools, backwater areas, and side channels. These areas provide high quality habitats for riparian birds, mammals, amphibians, and reptiles.

Under this alternative 51 miles of Upper Salt River drainage, 65 key riparian stream reaches, 187 existing springs, and an uncertain number of undeveloped springs would be available for grazing using a variety of management strategies yearlong (see appendix D, definitions).

Overall riparian wildlife habitat quality was evaluated for 65 key riparian stream reaches using key reach descriptions. Habitat quality is estimated to decline moderately to substantially along almost all key reaches. Primary reasons for expected declines in habitat quality include substantially increased numbers of livestock on some allotments, continued presence of livestock water developments, corrals, or other range infrastructure in or adjacent to key reaches, and/or descriptions of heavy use, trampling, and/or trailing reported during reach monitoring. Implementing this alternative appears unlikely to meet desired future conditions for riparian wildlife habitat quality in most riparian areas.

Several pastures proposed for grazing in the proposed action would give livestock access to riparian habitats in and around Campaign Bay near the southeastern end of Roosevelt Lake. This area has several large Southwestern willow flycatcher breeding areas and grazing these riparian habitats could cause substantial effects on the flycatcher and its occupied habitats. Without additional mitigation measures (management practices) to minimize effects, this alternative is likely to result in an adverse effects determination for the flycatcher and its critical habitat in the project biological assessment.

Cumulative Effects

Alternative 3 would affect the largest size and intensity of effects on riparian wildlife habitat compared with other project alternatives. With livestock use being proposed along Salt River and all riparian areas, impacts to endangered species may occur. Those effects could be direct impact of habitat conditions required for successful nesting/reproduction and with recruitment of new habitat for Southwestern willow flycatcher, yellow-billed cuckoo, Chiricahua leopard frog, and Mexican spotted owl. This proposed action does not comply with terms and conditions outlined in a biological opinion (USFWS 2012) for the Tonto NF Plan.

Environmental Consequences - Alternative 4 (Habitat Optimization Alternative)

Direct Effects

Disturbance, displacement, reduced habitat availability, and mortality similar to what is described for alternative 3. Implementing alternative 4 would reduce direct effects because grazing would occur outside of most or all of the breeding season for birds and many other wildlife species.

Indirect Effects

Similar to what is described for alternative 3; however implementing alternative 4 would reduce indirect effects because grazing would occur seasonally compared with year-round. Moving grazing outside the hottest time of year would also minimize effects of reducing wildlife cover and water during the hottest times of the year. Implementing alternative 4 is more likely to meet desired future conditions for riparian wildlife and habitats than the other action alternatives.

Cumulative Effects

Alternative 4 would have a smaller additive effect on overall cumulative effects than the proposed action or current management because fewer riparian wildlife habitats would be grazed and grazing would be seasonal rather than year-long.

Effects of vegetation management tools

Fencing and herding of livestock may be beneficial to habitat quality, if animals are kept out of this vegetation type through exclosures or active management. Exclosures allow habitat to grow and develop higher habitat quality. Fencing can cause mortality to wildlife, affect wildlife movement, and decrease habitat quality.

Water development may have beneficial effects by reducing livestock congregation in riparian areas. Developing water from springs and seeps may affect wildlife habitat quality at a local and landscape scale. These areas are generally support riparian areas, which can be stop-over areas for migratory birds, as well as areas of locally high biodiversity. A variety of direct and indirect effects can occur that can substantially reduce overall wildlife habitat quality locally, and contribute to cumulative effects.

Depending on existing condition of riparian habitat, *erosion control measures*, such as damming within riparian areas, may have an undesirable impact on habitat quality. Gabion and rip rap could have beneficial effects depending on what is trying to be accomplished and if grazing would occur at the same time. Effects to aquatic species could be undesirable.

Seeding and planting of native vegetation used in concurrence with grazing may not benefit habitat quality. It could also introduce non-local seed sources and alter historic plant strains.

Noxious weed treatments may initially lower habitat quality, but over a period of time as native vegetation becomes established, overall habitat quality would improve. This would only occur if native vegetation is allowed to establish following treatments. Treatment effects may also vary with post-treatment grazing strategy.

Environmental Consequences to Fish

Razorback Sucker (Endangered)

Razorback sucker is one of the larger members of the sucker family (*Catostomidae*), reaching lengths to 24 inches and weights to over 6 pounds. Adult fish are relatively robust. Its most noticeable feature is a sharp-edged keel that develops behind the head in adults. Coloration is dark olivaceous on the back and keel, fading to yellowish white on the abdomen. Males become dark brown to black on the back and develop a russet- to orange-colored lateral band and yellow belly. Coarse, sharp tubercles, whose function is to hold the female during the spawning act, develop on the anal, caudal, and pelvic fins, and on the caudal peduncle. Females that have spawned repeatedly may be scarred and abraded from contacts with males and with rocky bottoms.

Razorback sucker was once abundant throughout the Colorado River Basin, primarily in the main stem and major tributaries in the southwestern United States and northwestern Mexico. A significant commercial fishery for it existed in Saguaro Lake in 1949, but it has not appeared in collections since about that time. It disappeared from Roosevelt Lake just before the 1930s, but persisted in the Verde River Basin, in Peck's Lake near Clarkdale, at least until 1954. At present, the largest remaining population exists in Lake Mohave, and smaller populations exist in the Green River and the upper Colorado River sub-basin. No significant recruitment to any population has been documented in recent years.

On Tonto NF, razorback sucker have been stocked into the Verde and Salt rivers, and several of their larger tributaries.

General Effects

Activities that create a possibility of introducing non-native predatory fish (such as construction of stock tanks) are a threat to persistence of the razorback sucker.

Gila Topminnow (Endangered)

Gila topminnow was historically widespread and abundant in the Gila River drainage. It was described as "one of the commonest fish in the southern part of the Colorado River drainage..." in the early 1940s, and was found throughout the Gila River system up to about 4,500 feet elevation. Today Gila topminnow is eliminated from all riverine habitats and remains in only eight natural sites (two on public lands) and in a varying number of transplanted sites. Gila topminnow was reported from the Salt River at Roosevelt and in Tonto Creek in 1904. It currently exists at seven sites on Tonto NF.

Habitat requirements of Gila topminnow are fairly broad; it prefers shallow, warm and fairly quiet waters, but can adjust to a rather wide range, living in quiet to moderate currents, depths to three feet, and water temperatures from constant 80° F springs to streams fluctuating from 43 to 99° F. The species lives in a wide variety of water types; springs, cienegas, marshes, permanent or interrupted streams, and formerly along the edges of large rivers. Preferred habitat contains dense mats of algae and debris, usually along stream margins or below riffles, with sandy substrates sometimes covered with organic mud and debris.

General Effects

Livestock grazing can destabilize stream channels and disturb riparian ecosystem functions (Hereford 1992, Tellman et al. 1997). Livestock can negatively affect Gila chub habitat through removal of riparian vegetation (Clary and Webster 1989, Clary and Medin 1990, Schulz and Leininger 1990, Armour et al. 1991, Fleishner 1994), which can result in reduced bank stability, fewer pools, and higher water temperatures (Meehan 1979, Kauffman and Krueger 1984, Swanson et al. 1982, Rinne and Minckley 1985, Fleishner 1994, Belsky et al. 1999). Livestock grazing can also cause increased sediment in the stream channel, due to streambank trampling and riparian vegetation loss (Weltz and Wood 1986, Waters 1995, Pearce et al. 1998).

Livestock physically alter stream banks through trampling and shearing, leading to bank erosion (Platts and Nelson 1989, Trimble and Mendel 1995). In combination, loss of riparian vegetation and bank erosion can alter channel morphology, including increased erosion and deposition, down-cutting, and an increased width/depth ratio, all of which lead to a loss of pool habitats required by the Gila chub, and to loss of shallow side and backwater habitats used by larval chub (Trimble and Mendel 1995, Belsky et al. 1999).

Desert Pupfish (Endangered)

Desert pupfish once was widespread and abundant in southern Arizona, southeastern California, northern Baja California, and Sonora. Its habitat in the lower Gila and Colorado River drainages comprised a wide diversity of waters that consisted of the margins of the larger lakes and rivers, desert springs, marshes, and tributary streams including the Salt, San Pedro, and Santa Cruz rivers. Currently no natural populations of desert pupfish occur in Arizona (Quitobaquito pupfish (*C. eremus*, formerly *C. m. eremus*) occurs on Organ Pipe Cactus National Monument). In California, several populations persist in tributaries to the Salton Sea, and in Mexico pupfish exist along the Colorado River delta and in other nearby wetlands. Several transplanted populations are on private and public lands in Arizona and California, including one at Boyce Thompson Arboretum near Superior.

General Effects

See effects for Gila topminnow

Gila Chub (Endangered)

In Arizona, Gila chub are known to have occupied portions of the Salt, Verde, Santa Cruz, San Pedro, San Carlos, San Simon, San Francisco, and Agua Fria drainages in addition to smaller tributaries of the main stem Gila River. Small remnant populations remain in most of these drainages with the exception of the Salt and San Simon Rivers, where all known populations have been extirpated (Weedman et al. 1996, Propst 1999).

General Effects

See effects for Gila topminnow.

Spikedace (Endangered)

Adult spikedace occupy midwater habitats of runs, pools, and swirling eddies that are typically less than one foot deep with velocities of one to two feet per second. Adults often aggregate in shear zones along gravel bars, quiet eddies on the downstream edge of riffles, and broad, shallow areas above gravel sand bars. Larval spikedace most commonly occupy slow velocity waters near stream margins over sand dominated substrates.

In winter, spinedace appear to seek out protected areas, either cobble streambanks or slow velocity areas in the lee of gravel bars. Spawning occurs in shallow sand and gravel bottomed riffles. Physical cover in the form of instream or overhead objects does not appear to be a factor in the habitat requirements of the species.

Primary Constituent Elements (PCE) for spinedace are:

- Habitat to support all egg, larval, juvenile, and adult spinedace, which includes:
- Perennial flows with a stream depth generally less than 1 m (3.3 ft), and with slow to swift flow velocities between 5 and 80 cm per second (1.9 and 31.5 in. per second).
- Appropriate stream microhabitat types including glides, runs, riffles, the margins of pools and eddies, and backwater components over sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness;
- Appropriate stream habitat with a low gradient of less than approximately 1.0 percent, at elevations below 2,100 m (6,890 ft.); and
- Water temperatures in the general range of 8.0 to 28.0° C (46.4 to 82.4° F).
- An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies.
- Streams with no or low levels of pollutants.
- Perennial flows, or interrupted stream courses that are periodically dewatered, but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.
- No nonnative aquatic species or levels of nonnative aquatic species that are sufficiently low as to allow persistence of spinedace.
- Streams with a natural, unregulated flow regime that allows for periodic flooding or, if flows are modified or regulated, a flow regime that allows for adequate river functions, such as flows capable of transporting sediments.

General Effects

Livestock grazing has been one of the most widespread and long-term causes of adverse impacts to native fishes and their habitat (Miller 1961), but is one of the few threats where adverse effects to species such as spinedace and loach minnow are decreasing, due to improved management on Federal lands (USFWS 1997c, USFWS 2001). This improvement occurred primarily by discontinuing grazing in the riparian and stream corridors. However, although adverse effects are less than in the past, livestock grazing within watersheds where spinedace and loach minnow and their habitats are located continues to cause adverse effects. These adverse effects occur through watershed alteration and subsequent changes in the natural flow regime, sediment production, and stream channel morphology (Chaney et al. 1990, Belsky et al. 1999, USFWS 2001).

Livestock grazing can destabilize stream channels and disturb riparian ecosystem functions (Chaney et al. 1990, Armour et al. 1991, Tellman et al. 1997, and Wyman et al. 2006). Medina et al. (2005) note that the impacts of grazing vary within and among ecoregions, and that some riparian areas can sustain little to no ungulate grazing, while others can sustain high use. They further note that threatened and endangered fish populations and their associated riparian habitat may require some form of protection from grazing of all ungulates (e.g., elk, deer, and cattle). Improper livestock grazing can negatively affect spinedace and loach minnow through removal of riparian vegetation (Propst et al. 1986, Clary and Webster 1989, Clary and Medin 1990, Schulz and Leininger 1990, and Fleishner 1994), that can result in reduced bank stability and higher

water temperatures (Kauffman and Krueger 1984, Platts and Nelson 1989, Fleishner 1994, Belsky et al. 1999).

Livestock grazing can also cause increased sediment in the stream channel, due to streambank trampling and riparian vegetation loss (Weltz and Wood 1986, Pearce et al. 1998; Belsky et al. 1999). Livestock can physically alter the streambank through trampling and shearing, leading to bank erosion (Trimble and Mendel 1995 and Belsky et al. 1999). In combination, loss of riparian vegetation and bank erosion can alter channel morphology, including increased erosion and deposition, increased sediment loads, down cutting, and an increased width-to-depth ratio, all of which lead to a loss of spinedace and loach minnow habitat components.

Headwater Chub (Sensitive, Candidate for Listing)

Headwater chubs occupy middle to headwater reaches of medium-sized streams of the Gila River Basin at elevations of 925 to 2,000 meters (3,035 to 6,651 feet). Headwater chubs are usually found in large pools and are usually associated with cover such as undercut banks, large pools, or deep places created by obstructions like trees or rocks. Typical adult microhabitat consists of deep, near shore pools adjacent to swifter riffles and runs.

General Effects

As early as the turn of the century, Chamberlain (1904) identified cattle grazing, erosion, and water diversions for irrigation and mining as causes of water quality problems resulting in decline and extinction of Southwestern fishes. Platts (1991) concluded that livestock grazing negatively impacts riparian habitats and fish populations. Unmanaged livestock trample stream banks, compact soils, and remove protective riparian vegetation from the stream bank, resulting in increased erosion, sedimentation, water temperatures, and decreased habitat quality as described in the Statewide Conservation Agreement for six non-listed native fish in Arizona.

Watershed degradation causes arroyo cutting, erosion and the disappearance of riparian vegetation; direct results of a lowered water table (and Minckley Rinne 1991). Grazing impacts stream morphology by contributing to the deterioration of soil stability and porosity and increasing erosion and soil compaction (Fleischner 1994). In grazed areas, stream channels contain more fine sediment, stream banks are more unstable, and banks are less undercut (Platts 1991). The activities of livestock (removal of vegetation and trampling) are additive in their effects on the aquatic habitat. The trampling and loss of undercut banks results in a homogenization of habitat types, this process is accelerated by removal of riparian plant species, particularly sedges, grasses, and shrubs, which stabilize undercut banks. In addition, trampling results in wider channels, which results in higher summer and colder winter water temperatures, but these temperature changes, are exacerbated by the removal of vegetative and undercut bank cover. Removal of riparian vegetation results in lower plant density and less complex structure, which results in increased erosion and therefore increased turbidity. Turbidity is also increased due to trampling of stream banks and urination onto unprotected soils (Platts 1991).

Roundtail Chub (Sensitive, Candidate for Listing)

A moderately streamlined member of the minnow family (Cyprinidae), the roundtail chub has a slender caudal peduncle and a deeply forked, relatively large caudal fin. Coloration of adults is silvery shading dorsally to dusky yellow or light green. Both sexes have orange-red coloration of the ventrolateral surface and on all fins except the dorsal. Both males and females possess breeding tubercles to a highly variable degree.

Roundtail chub is widespread in moderate to large rivers of the Colorado River Basin. In Arizona, it still occurs in the main stem and tributaries to the Verde and Salt rivers, although populations have declined considerably during the past few decades.

Roundtail chub occupy cool to warm water, mid-elevation streams and rivers where typical adult microhabitat consists of pools to eight feet deep adjacent to swifter riffles and runs. Cover is usually present and consists of large boulders, tree root wads, submerged large trees and branches, undercut cliff walls, or deep water. Smaller chubs generally occupy shallower, low velocity water adjacent to overhead bank cover. Roundtail chub appear to be very selective in their choice of pools, as they are commonly found to congregate in certain pools, and are not found in similar, nearby pools. Spawning takes place over gravel substrate. Tolerated water temperatures range up to 80° F.

General Effects

See effects for Gila topminnow.

Migratory Birds in the Project Area

Executive Order 13186, of January 10, 2001, directs Federal agencies to support migratory bird conservation and to “ensure environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern.” No designated Important Bird Areas occur within the action area. There is an overwintering designated area along the southern end of the Tonto Basin Allotment. This area is closed to use from November 15 to February 15 for overwintering geese.

Salt River and its tributaries serve as corridors for migration of birds within and through the Tonto National Forest. Although relatively small watersheds, migratory birds use the riparian areas for habitat needs while migrating to different latitudes depending on the time of year. Historically, perennial and intermittent channels in these allotments most likely supported higher cover of riparian vegetation, broader floodplains, stable channels, and more extensive perennial water than currently observed (Mason and Grove 2009). Therefore, riparian areas in these allotments most likely do not provide as much habitat for migratory birds as they did in the past.

Recreation, Wilderness, Visual Quality

Desired Condition

The Forest Plan identifies the Recreation Opportunity Spectrum (ROS) class system, and the Wilderness Opportunity Spectrum (WOS) class system categories used on forest lands to help guide development and management in order to provide a variety of recreation and wilderness experiences desired by the public. The ROS spectrum is broken into Semi-Primitive Non-Motorized (SPNM), Semi-Primitive Motorized (SPM), Roaded Natural (RN), Rural (R), and Urban (U) classes. The WOS spectrum is broken into classes I, II, III, and IV. Classes of recreation and wilderness experiences are described in appendix A, map 11, and appendix D. The table below shows the number and miles of roads and trails, and the number and percentage of acres of each class, in the analysis area.

Table 21: ROS/WOS Acres, Roads, and Trails

Class	Acres	Percentage	# of Roads	Miles Road	# Trails	Miles Trail
SPNM	137,435	49.82%	69	77.24	8	20.70

Class	Acres	Percentage	# of Roads	Miles Road	# Trails	Miles Trail
SPM	72,416	26.25%	130	168.28	2	2.41
RN	63,274	22.94%	174	211.41	6	3.64
R	2,731	0.99%	6	3.26	0	0
ROS Total	275,856	100%	279	460.19	9	26.75
WOS I	29,471	70.82%	N/A	N/A	6	3.25
WOS II	11,931	28.67%	N/A	N/A	7	19.12
WOS III	148	0.35%	N/A	N/A	2	0.57
WOS IV	66	0.15%	N/A	N/A	2	0.23
WOS Total	41,616	100%	N/A	N/A	9	23.17
Total	275.856	100%	279	460.19	9	26.75

Uplands of the analysis area are primarily a mixture of roaded natural, semi-primitive motorized, and semi-primitive non-motorized recreation opportunities. Sierra Ancha and Salt River Canyon wildernesses are primarily WOS Classes I and II. Campsites along Upper Salt River are in semi-primitive motorized in the Salt Banks segment, semi-primitive non-motorized in the Gleason segment, and WOS Opportunity Class II in the Wilderness segment.

The Forest Plan assigns a Visual Quality Objective (VQO) for the purpose of maintaining or enhancing the scenic qualities of the Tonto's landscapes. VQO Classes, described in appendix D, represent different degrees of acceptable alterations to national forest landscapes. The Forest Plan directs a VQO of "Retention" (man's activities are not evident to the casual observer) for the Upper Salt River Management area and "preservation" (provides for ecological changes only) in Salt River Canyon and Sierra Ancha wildernesses.

The Salt River Canyon Wilderness Implementation Plan (SRCWIP) (U.S. Forest Service 1993) states that a Limits of Acceptable Change (LAC) concept "will be used to access acceptable conditions in the wilderness, establish a program of monitoring conditions, and evaluate management effectiveness" and that "management of the recreation resource will be consistent with the specified WOS Class." The SRCWIP sets LAC standards for the wilderness segment of Upper Salt River (appendix D). Similarly, the Implementation Plan for Upper Salt River (IPUSR) (U.S. Forest Service 1993a) sets LAC standards for the Salt Banks and Gleason segments, "consistent with their specified ROS classes." Both plans direct management personnel to inventory and evaluate LAC indicators on a continuing basis using the Campsite Inventory and Analysis Form (Appendix D).

The *Wilderness Act* defines wilderness as "in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation" (*Wilderness Act Public Law 88-577* (16 U.S. C. 1131-1136)).

The Forest Plan and SRCWIP, along with FSM 2300 “Recreation, Wilderness, and Related Resource Management” specify the following desired conditions:

- The portion of this management area from near the Highway 288 Bridge upstream to the Fort Apache Reservation boundary was studied by the Forest Service for inclusion in the National Wild and Scenic Rivers System at the direction of the U.S. Congress. Present management emphasis will not preclude future Congressional designation of this river (U.S. Forest Service 1985).
- The primary emphasis for Salt River Canyon Wilderness is the preservation of naturally occurring flora, fauna, aesthetics and ecological processes while providing a very high quality white water river running experience (U.S. Forest Service 1985).
- Manage for VQO of “Preservation” (provides for ecological changes only) in Salt River Canyon and Sierra Ancha wildernesses (U.S. Forest Service 1985).
- Manage for VQO of “Retention” (man’s activities are not evident to the casual observer) in Upper Salt River management area (U.S. Forest Service 1985).
- Ensure that other activities that are authorized by the *Wilderness Act*, including grazing, will be conducted so as to minimize their impact on wilderness character (U.S. Forest Service 1985).
- For Gleason segment, manage ROS classes according to existing inventory as semi-primitive non-motorized 98 percent, and primitive 2 percent (U.S. Forest Service 1985).
- Construct only minimal new range improvements deemed essential for level B management (U.S. Forest Service 1985). “Construction of new range improvements may be approved if they are necessary for resource protection (range and/ or wilderness) and the effective management of those resources. Do not approve construction solely to accommodate increased grazing” (FSM 2300; 2326.01).
- In wilderness, accomplish management activities with non-motorized equipment and non-mechanical transport of supplies and personnel. Exclude the sight sound and other tangible evidence of motorized equipment or mechanical transport within the wilderness except where they are needed and justified (FSM 2300; 2326.02). Do not approve the use of motorized equipment or mechanical transport unless justified as described in FSM 2326.1.
- Adhere to the guidelines on grazing in Salt River Canyon Wilderness Implementation Plan (SRCWIP) including:
 - Preserve a wide spectrum of primitive recreation opportunities consistent with established objectives for each opportunity class. A high priority will be placed on maintaining the integrity of the WOS classes.
 - As an LAC standard is approached by trends of wilderness conditions, develop corrective prescriptions, including where necessary rationing of use, so that the standard is not exceeded.
 - Permittee requests for the use of motorized equipment will be thoroughly analyzed to ensure they meet the “rule of practical necessity and reasonableness” thereby ensuring the least impact possible on recreational users wilderness experience.
 - Salt will be located away from water and areas of public concentration and necessary feeders will be constructed of natural materials.
 - Construct needed structural range improvements from native materials when possible. Pipelines where essential should be buried.

Existing Condition

Upper Salt River is an undammed, free-flowing whitewater river. As such, its water level is entirely dependent upon annual rainfall and snowpack in its basin, located in the White Mountains of Arizona. Water levels can drop below 100 cubic feet per second (cfs) in summer and have risen as high as 143,000 cfs at flood stage. Recreational river running typically occurs in the spring, at water levels ranging between 500 cfs and 10,000 cfs, with some additional use in summer monsoon season.

The rafting portion of Upper Salt River runs 52 miles from the put-in near the Highway 60 Bridge to the take-out at the Highway 288 Bridge. Administratively, this is broken up into three segments; the 9-mile Salt Banks segment, 11-mile Gleason segment, and 32-mile wilderness segment. The Forest Service co-manages Upper Salt River with the White Mountain Apache Tribe, whose tribal lands on the north side of the river extend 28.9 miles west of the Highway 60 put-in.

The Forest Service issues permits to four commercial outfitters for the Upper Salt River. Outfitters' clients are from all over the United States, with the majority coming from the Four Corners Region. These small businesses book half-day, full-day, or overnight trips on the Salt Banks and Gleason segments, or three-to-five day trips for the entire length of river. Bookings vary yearly with the snowpack and water level. In 2010, a year with normal snowpack, the outfitters sold 8,098 user days (one person on the river for one day), grossing a total of \$774,935.

From March 1 to May 15 the Forest Service requires a permit for private boaters (people with their own boats, who wish to organize their own trips) to boat through the Salt River Canyon Wilderness. Private boaters pay a \$10 application fee to be included in a yearly random drawing for special recreation permits. There are four of these permits available, for trips of up to fifteen people, for each of the 76 days of the permitted season, or 304 available permits. There is a onetime fee of \$125 for each permit. In 2010, 1,792 people applied, and 282 permits were issued, to boat through Salt River Canyon Wilderness, generating \$53,170 in permit fees. Private boaters also conduct day and overnight trips on the Salt Banks and Gleason sections where no Forest Service permit is required.

Private boater application data shows that boaters come from as far away as Massachusetts and Alaska. Most applicants are from urban areas and are from the Southwest. Sizable populations from the Northwest, California, and Texas also apply.

While it is known that, through spending on gas, food, lodging and other items, river recreationists contribute to local jobs and revenue, no study has been conducted to determine the amount of revenue that boaters provide to communities near Upper Salt River. Given that almost all commercial and private boaters are from outside the Globe/Miami area, it is likely that boating on Upper Salt River is this local community's largest source of ecotourism dollars.

Commercial and private boaters on Upper Salt River must practice leave no trace camping and have a number of special regulations that they must follow. These include containing their fires in a fire pan, so as not to leave a mark on beach soil and carrying and using a human waste removal system.

Road and trail access is a key factor that determines amount and type of non-river-running recreation use along Upper Salt River Canyon area. OHV use, horseback riding, mountain biking,

fishing, swimming, hiking, camping, picnicking, wildlife viewing, bird watching, hunting, target shooting, and scenic driving primarily take place where forest roads and trails provide access.

- *Scenic Driving / Mountain Biking / OHV Use:* The area surrounding Salt River Canyon offers a variety of views of some of the most beautiful scenery in the Southwestern United States. Views range from pine forests of Timber Camp and Sierra Ancha Mountains, to saguaro laden vistas of the Sonoran Desert. Vehicles used for scenic driving vary with the terrain, and range from passenger cars to dirt and mountain bikes. Ranger district recreation personnel report that OHV scenic driving is the most common recreational use in the uplands of the analysis area, and is often combined with other recreational uses such as hunting, target shooting, fishing and picnicking.
- *Hunting / Fishing:* Hunting and fishing are year-round activities in the analysis area. Not surprisingly, hunting increases in the seasons permitted for taking large game. Fishing on the Upper Salt River is primarily for catfish and initiates at vehicle access points like Horseshoe Bend and Gleason Flat.
- *Horseback Riding:* While much of the horseback riding in the analysis area emanates from the Timber Camp Equestrian Site, the trailheads of the Sierra Ancha Wilderness and forest roads like Horseshoe Bend Road (FR 219) and Gleason Flat Road (FR 303) are also launching-off points for equestrians.
- *Hiking:* Most hiking in the analysis area takes place in the Sierra Ancha Wilderness. While there are no trails in or leading into Salt River Canyon Wilderness, people occasionally hike down tributaries like Cherry Creek or Coon Creek.
- *Wildlife Viewing / Bird Watching:* Due to its close proximity to the high elevation Mogollon Rim and Sierra Ancha Mountains, and low elevation deserts surrounding Upper Salt River, there is a great range of available birds and wildlife to view in the area surrounding Upper Salt River. Much of this activity happens from forest roads in combination with scenic driving.

There are three developed recreation areas in the analysis area; Timber Camp Recreation Area, Jones Water Recreation Area, and Bull Canyon Trailhead.

Timber Camp Recreation Area is a heavily used campground located 26 miles east of Globe Arizona on the north side of Highway 60. It is broken into 4 separate sites, all of which are fenced off from the surrounding grazing allotment. Timber Camp Equestrian Site and Brundrett Site 1 are available for use by reservation. Brundrett Site 2 and Timber Camp Day Use Picnic Area are open year-round.

Jones Water Recreation Area is a moderately used campground 19 miles east of Globe Arizona on the south side of Highway 60. The campground is in a riparian area with perennial water, and is not currently fenced off from the surrounding allotment. It has two concrete vault toilets available for use from the twelve campsites, each with a picnic table and fire ring.

Bull Canyon Trailhead is a simple gravel parking lot with a sign designating the trailhead.

Between 1991 and 2011 campsite inventories were conducted in 48 camps in the river corridor analysis area of Upper Salt River Canyon. These inventories show that impacts in campsites along the river have dropped significantly since the 1990s and, with the exception of campsites immediately adjacent to vehicle access points at Gleason Flats and Horseshoe Bend, they are well below established Limits of Acceptable Change (LAC). For instance, campsites in the wilderness

inventoried in 1999 had an average overall score of 21, with 67 percent of the inventoried campsites over the LAC of 19. In 2011 campsites inventoried in the wilderness had an average overall score of 5, with only .05 percent of the inventoried campsites over the LAC. Campsites inventoried from 1991 to 1999 had an average score of 20 while those inventoried between 2000 and 2011 had an average score of 8.

Impacts to the river corridor and campsites have dropped for a number of reasons including adoption and enforcement of Leave No Trace regulations for forest users and outfitters, the addition of actively patrolling river rangers, and removal of cattle from the river corridor.

There are a number of highly-visible range improvements in Upper Salt River Corridor. Pasture fences extending along the river downstream from Gleason Flat, and across the mouth of the creek at Coon Creek, are in wilderness segment river campsites which are managed as Wilderness Class II, and for a VQO of “preservation.” A corral in the Gleason Segment at Gleason Flat is at the end of a closed road (FR 303A) in an area managed as semi-primitive non-motorized with a visual quality of “retention.” Starting at this corral, an illegal user-made road was bulldozed by a previous range permittee upstream over a ridge to the east and then across Ash Creek where it leads to another corral.

Most recreational activity that takes place in the uplands surrounding the Upper Salt River occurs on or emanates from forest roads and trails. Depending upon their location and placement in relation to recreational activities, existing and proposed range improvements like piping, water troughs, stock tanks, corrals and fencing may present a visual impact to forest user’s recreational experience and the Forest’s ability to manage recreation opportunities. Range improvements along forest roads with a high degree of recreational usage like Horseshoe Bend Road (FR 219), Gleason Flat Road (FR 303, 303B), Shute Springs Road (FR 223), and Forest Road 897 have numerous range improvements in semi-primitive motorized areas that are highly visible and limit the areas ability to be “natural or natural appearing” (U.S. Forest Service 1985). Construction and maintenance of range improvements along the former Gleason Flat Road (FR 303A), which had been obliterated and signed closed as planned (IPUSR 19, C-1), has effectively “re-opened” this road to OHV travel in an area which is designated as semi-primitive non-motorized and a VQO if “retention”(U.S. Forest Service 1985).

Effects Analysis

Environmental Consequences - Alternative 1 (No Action)

Direct Effects: Direct effects of the No Grazing alternative include:

- Under this alternative, (with the exception of vehicle access points) desired conditions for recreation in Upper Salt River Corridor would be met.
- Cattle would not continue to produce manure, non-recreational trailing, tree and shrub damage, and trampling in uplands surrounding Upper Salt River.
- Existing and proposed rangeland allotment infrastructure (range improvements) would gradually be removed and cease to be visible throughout the analysis area.
- Grazing impacts to scenery would not impact forest user recreation experiences in uplands of the analysis area.

Indirect Effects: Indirect effects of the No Grazing alternative include:

- With this alternative and current management plans guiding management “present management emphasis will not preclude future Congressional designation of this river for inclusion in the National Wild and Scenic Rivers System” (U.S. Forest Service 1985).
- The primary emphasis for Salt River Canyon Wilderness, preservation of naturally occurring flora, fauna, aesthetics and ecological processes while providing a very high quality white water river running experience, would not be affected by livestock grazing.
- The Forest’s ability to provide the primitive, semi-primitive non-motorized and semi-primitive motorized recreation opportunities in the river corridor and the uplands specified by the Forest Plan, and maintain the integrity of the WOS classes of opportunities in Salt River Canyon Wilderness specified in Salt River Canyon Wilderness Implementation Plan would not be impeded by visible evidence of authorized grazing, like manure, trampling, trailing and tree and shrub damage, and visible range improvements, that decrease the amount of natural or natural appearing environment.
- As they are removed, visible existing range improvements, and grazing impacts to scenery would not be anticipated to inhibit the Forest’s ability manage Salt River Canyon Wilderness and Sierra Ancha Wilderness for a VQO of “preservation” and the Gleason Segment of the Upper Salt River for a VQO of “retention” required by the Forest Plan.
- With no direct impacts from grazing like cattle manure, tree and shrub damage by livestock and non-recreational trailing that are measured in campsite inventories (using the Campsite Inventory and Analysis Form) it is unlikely that the LAC for the Wilderness and Gleason segments of the Upper Salt River would be exceeded.

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects: Direct effects of the Current Management alternative include:

Under this alternative desired conditions for recreation in the Upper Salt River Corridor are anticipated to be met, as they are currently (with the exception of vehicle access points).

- Cattle would continue to produce manure, non-recreational multiple trailing, tree and shrub damage, and trampling in uplands surrounding the Upper Salt River, but not in Upper Salt River corridor.
- Existing and proposed rangeland allotment infrastructure (range improvements) is anticipated to be visible throughout the uplands of the analysis area.
- Grazing impacts to scenery are expected to affect forest user recreation experience in uplands of the analysis area.

Indirect Effects: Indirect effects of the Current Management alternative include:

Under the current management alternative, “present management emphasis will not preclude future Congressional designation of this river for inclusion in the National Wild and Scenic Rivers System” (U.S. Forest Service 1985).

- This alternative would not be expected to prohibit the Forest from preserving the primary emphasis for the Salt River Canyon Wilderness. Preservation of naturally occurring flora, fauna, aesthetics, and ecological processes while providing a high quality white water river running experience would continue.
- Visible evidence of grazing, like manure, trampling, multiple trailing and tree and shrub damage and visible range improvements are anticipated to decrease the amount of natural or natural appearing environment, and inhibit the Forest’s ability to provide primitive,

- semi-primitive non-motorized and semi-primitive motorized recreation opportunities in the Gleason segment of the river corridor, and the uplands of the analysis area, specified by the Forest Plan.
- To the degree that they are visible, existing range improvements and grazing impacts to scenery are anticipated to inhibit the Forest's ability manage the Gleason Segment of the Upper Salt River for the Visual Quality Objective (VQO) of "retention" required by the Forest Plan.
 - With no direct impacts from grazing like cattle manure, tree and shrub damage and non-recreational trailing that are measured in campsite inventories (using the Campsite Inventory and Analysis Form) it is unlikely that the LAC for the Wilderness and Gleason segments of the Upper Salt River would be exceeded.

Environmental Consequences - Alternative 3 (Proposed Action)

Direct Effects: Direct effects of the proposed action alternative include:

- Cattle would produce manure, non-recreational multiple trailing, tree and shrub damage, and trampling in river campsites, the Upper Salt River corridor, and uplands surrounding the river.
- Existing and proposed rangeland allotment infrastructure (range improvements) would be visible throughout the analysis area.
- Grazing impacts to scenery would impact forest user recreation or wilderness experience.
- Altering the ecosystem may negatively impact wildlife.
- Noxious weed and invasive plant removal/ reduction through mechanical, chemical, biological and fire treatments , as well as seeding/ planting native vegetation in recovering soils, may contribute to naturally occurring flora, fauna, aesthetics and ecological processes in the Salt River corridor.
- At the time of the writing of this draft it is not possible to analysis direct effects of specifically proposed range improvements as their placement within their listed pasture is unknown.
- Forest user perceptions of health and safety may be compromised when occupying river campsites at the same time as livestock.

Indirect Effects: Indirect effects of the proposed action alternative include:

- The direct effects above would have an undesirable effect on scenic and recreational Outstanding Remarkable Values (ORVs), and may "preclude future Congressional designation of this river in the National Wild and Scenic Rivers System."
- The Forest's ability to provide "a very high quality white water river running experience" is anticipated to be impeded by grazing impacts to scenery including manure, non-recreational multiple trailing, tree and shrub damage, and trampling in river campsites along the Upper Salt River.
- Visible evidence of grazing, like manure, trampling, multiple trailing and tree and shrub damage and visible range improvements is anticipated to decrease the amount of natural or natural appearing environment. This is expected to inhibit the Forest's ability to provide the spectrum of recreation opportunities (ROS) specified by the Forest Plan, including primitive, semi-primitive non-motorized and semi-primitive motorized in the river corridor and the surrounding uplands. It is also expected to inhibit the Forest's ability to maintain the integrity of the WOS classes of opportunities in the Salt River Canyon Wilderness specified in the SRCWIP.

- To the degree that they are visible, existing and proposed range improvements, and grazing impacts to scenery, are anticipated to inhibit the Forest's ability manage the Salt River Canyon Wilderness and Sierra Ancha Wilderness for the Visual Quality Objective (VQO) of "preservation" and the Gleason Segment of the Upper Salt River for the VQO of "retention" required by the Forest Plan.
- Direct impacts from grazing like cattle manure, tree and shrub damage and non-recreational trailing that are measured in campsite inventories (using the Campsite Inventory and Analysis Form) are expected to increase the likelihood of exceeding Limits of Acceptable Change (LAC) for the Wilderness and Gleason segments of the Upper Salt River.
- If wildlife is negatively affected by alteration of the ecosystem then wildlife viewing, bird watching, hunting and fishing may be impeded.
- Noxious weed and invasive plant removal/ reduction through mechanical, chemical, biological and fire treatments, as well as seeding/ planting native vegetation in recovering soils, may enhance the recreational and wilderness experience of forest users by contributing to the naturally occurring flora, fauna, aesthetics, and ecological processes in the Salt River corridor.
- At the time of the writing of this draft, it is not possible to analyze the indirect effects of the specifically proposed range improvements as their placement within their listed pasture is unknown.
- Forest user perceptions of health and safety being compromised by occupying river campsites at the same time as livestock is anticipated to inhibit the Forest's ability to provide "a very high quality white water river running experience" as described in the Forest Plan.

Effects of Proposed Management Tools

Fencing/ herding to improve livestock distribution: Beneficial tool to recreational and wilderness experience if it helps keep livestock out of Salt River Corridor through exclosures or active management. Visual impacts of range improvements inside Salt River Canyon Wilderness may adversely affect Scenic and Recreational ORVs for Wild and Scenic River eligibility and the Forest's ability to provide a VQO of "preservation" and spectrum of recreation and wilderness opportunities defined in the Forest Plan. Fencing not built to forest wildlife standards can cause mortality to wildlife and affect wildlife viewing opportunities. Recreational users sometimes affect fencing and grazing patterns by leaving gates open.

Water development to improve livestock distribution: Visual impacts of these range improvements inside the Salt River Canyon Wilderness may adversely affect Scenic and Recreational ORVs for Wild and Scenic River eligibility and the Forest's ability to provide a VQO of preservation and spectrum of recreation and wilderness opportunities defined in the Forest Plan. Water developments may be beneficial to recreational and wilderness experience if it helps keep livestock out of the Salt River Corridor.

Erosion control structures: Erosion control structures have occurred alongside recreation sites and recreation activities in roaded and semi-primitive motorized areas in the uplands for years largely without comment from recreational users, including in the scoping phase of this project, and is unlikely to affect recreational resources or experience in these areas.

Seeding/ planting native vegetation in recovering soils: May contribute to the naturally occurring flora, fauna, aesthetics and ecological processes in the project area and enhance the recreational and wilderness experience of forest users.

Salt and/or low moisture blocks to distribute livestock across the landscape: Beneficial to users recreational and wilderness experience if it is placed away from water and areas of public concentration and it is placed in such a way as to help keep livestock out of the Salt River Corridor.

Noxious weed and invasive plant removal/ reduction: May contribute to the naturally occurring flora, fauna, aesthetics and ecological processes in the project area and enhance the recreational and wilderness experience of forest users.

Timber/ fuel wood sales for tree density management; fuels reduction through prescribed fire and mechanical methods: Prescribed fire and mechanical treatments have occurred alongside recreation sites and recreation activities in roaded and semi-primitive motorized areas in the uplands for years largely without comment from recreational users, including in the scoping phase of this project, and is unlikely to affect recreational resources or experiences in these areas.

Environmental Consequences - Alternative 4 (Wildlife Habitat Optimization)

Direct Effects: Direct effects of the Habitat Optimization alternative are the same as for alternative 2 and in addition, habitat prescriptions may optimize forage and production, benefiting wildlife.

Indirect Effects: Indirect effects of the Habitat Optimization alternative are the same as for alternative 2 and, if habitat prescriptions benefit wildlife, wildlife-related recreational activities like wildlife viewing, bird watching, hunting and fishing may be positively affected.

Recommendations Common to All Alternatives

Management Practices

- In the Salt River Canyon Wilderness construct needed structural range improvements from native materials when possible. Pipelines where essential should be buried (U.S. Forest Service 1993).
- Construct only minimal new range improvements deemed essential for level B management. "Construction of new range improvements may be approved if they are necessary for resource protection (range and/or wilderness) and the effective management of these resources. Do not approve construction solely to accommodate increased grazing" (FSM 2300; 2320.1).
- Preserve a wide spectrum of primitive recreation opportunities consistent with established objectives for each opportunity class. A high priority will be placed on maintaining the integrity of the WOS classes (U.S. Forest Service 1993).
- Manage for the Visual Quality Objective of "Preservation" (provides for ecological changes only) in the Salt River Canyon Wilderness and the Sierra Ancha Wilderness (U.S. Forest Service 1985).
- Manage for the Visual Quality Objective of "Retention" (man's activities are not evident to the casual observer) in the Upper Salt River management area (U.S. Forest Service 1985).
- In wilderness, accomplish management activities with non-motorized equipment and non-mechanical transport of supplies and personnel. Exclude the sight sound and other

tangible evidence of motorized equipment or mechanical transport within the wilderness except where they are needed and justified (FSM 2300, 2326.02). Do not approve the use of motorized equipment or mechanical transport unless justified as described in FSM 2300, 2326.1.

- Permittee request for the use of motorized equipment will be thoroughly analyzed to ensure they meet the “rule of practical necessity and reasonableness” thereby ensuring the least impact possible on recreational users wilderness experience (U.S. Forest Service 1993).
- Ensure that other activities that are authorized by the *Wilderness Act*, including grazing, will be conducted to minimize their impact on wilderness character (U.S. Forest Service 1985).
- Salt will be located away from water and areas of public concentration and necessary feeders will be constructed of natural materials (U.S. Forest Service 1993).

Recommendations

- At the time of the writing of this draft it is not possible to analyze the specifically proposed range improvements, as their placement within their listed pasture is unknown.
- Where possible in areas designated as semi-primitive, non-motorized, and semi-primitive motorized make existing range improvements less evident to a casual forest observer by relocation, use of native materials, or painting them to blend in.
- The pasture fence along the river in Gleason Flat should be relocated so that it is not within sight of the river or the river campsites in the Gleason Segment of the Upper Salt River and the Salt River Canyon Wilderness. In addition, the bottom strand of wire on this fence should be changed from barbed to smooth wire so that it no longer negatively affects wildlife.
- Move the corral along the decommissioned former FR 303A road to the end of the FR 303B road just west of Butte Creek to truly close FR 303A and allow the permittee to access the corral by truck.
- The pasture fence across the mouth of the creek at Coon Creek should be relocated so that it is not within sight of the river campsites in the Salt River Canyon Wilderness. Remove this fence entirely, if the pasture is not to be used.
- In order to provide “a very high quality white water river running experience” as described in the Forest Plan minimize compromises to Forest user perceptions of health and safety by conducting grazing activities in Upper Salt River corridor outside the high use river season from mid-February until the end of May.
- In areas designated as WOS Class I, WOS Class II, Semi-Primitive Non-Motorized, and Semi-Primitive Motorized construct needed structural range improvements where, and in such a manner, that they are not evident to a casual forest observer.

Heritage and Archaeology

Heritage resources are distributed throughout all of the vegetation zones in all six of the allotments. With the exception of riparian zones, which rarely contain prehistoric archaeological sites but which may still contain historic properties and heritage values for Tribes, current levels of inventory do not indicate that site densities vary substantially by vegetation type. Different archaeological site types (e.g., residential, agricultural, natural resource procurement, etc.) may vary somewhat between elevation zones and thus vegetation types, but the relationship between site type and density will not be understood for this area without significantly more archaeological survey. All site types, however, are subject to the same types of impacts from

grazing regardless of their environmental context, so any differentiation of analysis of effects on heritage resources by vegetation type would be moot.

Desired Condition

Heritage resources are protected from mechanical disturbance and incur no more impact from livestock than has been the case historically. The environmental context of the heritage sites on these allotments, especially as regards vegetation and the intrusion of modern constructed facilities resembles its historical environmental context to the extent feasible and/or is at least free of non-native species.

Forest Plan

The Forest Plan does not specify desired future conditions for heritage resources on the Forest; however, it does specify that "...the preferred management of sites listed in, nominated to, eligible for, or potentially eligible for the National Register [of Historic Places] is avoidance and protection." It further states that "Preservation of Heritage resources in place will become increasingly important under the following conditions [including] where the cultural values derive primarily from the qualities other than research potential, and where those values are fully realized only when the cultural remains exist undisturbed in their original context(s)..."

Forest Service Manual Direction

Owing to the complexity and diversity of heritage or cultural resources on the National Forests, the Forest Service Manual does not specify one overarching desired future condition. However, FSM 2364.02 lists as the first three objectives for the protection and stewardship of heritage resources:

- Protect cultural resources in a manner consistent with their National Register qualities and management allocations.
- Avoid or minimize the effects of Forest Service or Forest Service-authorized land use decisions and management activities on cultural resources.
- Safeguard cultural resources on National Forest System lands from unauthorized or improper uses and environmental degradation.

Existing Condition: Archaeological and Historic Sites

Haystack Butte, Dagger, Sedow, Poison Springs/Sierra Ancha, Chrysotile, and Hicks-Pikes Peak Allotments are all known to contain hundreds of prehistoric archaeological sites representing the occupation and agricultural modification and use of this area by people related to the Hohokam and Salado archaeological traditions over a period of 8,000 to 10,000 years. They also contain many historic sites reflecting the use and occupation by Apache hunters, gatherers, and farmers, Anglo ranchers, stockmen, miners and prospectors, the Civilian Conservation Corps (CCC) and the Forest Service.

A number of archaeological surveys have been conducted within these six allotments. As a result, hundreds of sites have been formally inventoried. However most of this area remains unsurveyed. Many more sites are known or have been reported and informal reconnaissance has revealed that some areas within the allotments have high site densities. Known heritage properties include a wide variety of features, ranging from massive multi-room masonry prehistoric residential sites to simple artifact scatters and CCC erosion control features. Most of the features are prehistoric and consist of collapsed stone masonry structures ranging from single room field houses to large compound and room block sites, various water control devices such as check

dams, and terraces, and roasting pits for the processing of agave. There are also a large number of features associated with a long history of cattle ranching and a more than a few reflecting prospecting, mining, and ore processing, especially for asbestos and uranium. Many other prehistoric and historic archaeological sites are represented by nothing more than a scatter of artifacts on the ground surface.

Between the prehistoric occupation and the arrival of Anglo miners and ranchers, this area was also extensively occupied by the Apache, who left their own nearly ephemeral archaeological signature and who still maintain connection to the area through traditional use areas and sacred places, though no specific traditional cultural properties, native plant gathering areas, or tribal sacred sites have been identified on the ground. However, no specific efforts to identify and inventory such areas have been made.

From the 1870s to the early 1920s, grazing of what would become these six allotments was heavy and unregulated. This resulted in an initial reduction of vegetative cover which would have affected heritage resources due to soil loss, erosion, and trampling. Since the establishment of allotments and implementation of grazing management, impacts to known and inventoried heritage resources have lessened and, in many cases, these properties may have improved in condition as vegetative cover has returned.

Existing Condition: Contemporary Tribal Uses

Haystack Butte, Dagger, Sedow, Poison Springs/Sierra Ancha, Chrysotile, and Hicks-Pikes Peak Allotments contain many plant and animal species, water sources, minerals, and geographic landforms and places that have significance to contemporary Indian Tribes for their use in traditional economies, religious practices, or in Tribal and clan histories. Most recently, the Tonto NF was occupied by Apache and Yavapai peoples and still retains significance through affiliation into either the recent past or prehistory for the O'odham, Hopi, and Zuni peoples.

An important consideration in the fulfillment of the Forest Service mission is the trust relationship the Forest Service has with these Tribes and the potential impact Forest Service policy, program, and project decisions may have on them. Tonto National Forest recognizes that several area Tribes have cultural ties to and knowledge about lands now managed by the Forest Service. Many tribal members regularly visit the forest to harvest traditional plant resources such as acorns, pinyon nuts, arrowweed, agave, willow, cattails, and beargrass, to collect medicinal plants and mineral resources for personal and ceremonial uses, to collect firewood, and to visit traditional cultural properties and sacred sites, activities that require motorized access, particularly for Tribal elders, who make up the majority of traditional practitioners. The Tribes, therefore, share an interest in protecting important natural and cultural resources from damage, including that caused by grazing and the construction of new livestock improvement facilities. Several of these allotments are also adjacent to and provide access to Tribal reservation land belonging to White Mountain Apache Tribe and San Carlos Apache Tribe.

Some general locations used by Tribal members to conduct traditional activities such as plant collection and religious rites on the Forest are known, but no specific locations were identified during scoping that are within the Area of Potential Effect (APE) for this analysis, though it is known that Tribal members utilize portions of some or all of these allotments as traditional resource gathering areas and may have sacred sites located there as well.

Tribal consultation is necessary to identify and protect these areas of traditional cultural and religious use. This process for the Forest is guided through a variety of laws, Executive Orders, Memorandums, and case law. Some of those laws include: *National Historic Preservation Act* (NHPA) and subsequent amendments, *Archaeological Resources Protection Act*, *American Indian Religious Freedom Act*, *National Environmental Policy Act*, and *National Forest Management Act*. Executive Orders and Memorandum include *1994 Government-to-Government Relations with Native American Tribal Governments*, *E.O. 13007 Accommodations of Sacred Sites*, and *E.O. 12898 Environmental Justice*. Depending on the specific location of an undertaking, the Forest routinely consults between nine and thirteen Tribes regarding proposed projects and management policies. These are: Apache (San Carlos Apache Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, and Yavapai-Apache Nation), Four Southern Tribes (Salt River Pima-Maricopa Indian Community, Gila River Indian Community, Ak Chin Indian Community, and the Tohono O'odham Nation), Hopi Tribe, Pueblo of Zuni, and Yavapai (Yavapai-Prescott Tribe, Fort McDowell Yavapai Nation, and Yavapai-Apache Nation).

Effects Analysis

Environmental Consequences - Alternative 1 (No Action)

Direct Effects

There would be no direct effects from livestock grazing under this alternative.

Indirect Effects

Indirect effects on archaeological and historic sites can include erosion and changes in vegetative composition and density that alter the setting and geographic context of sites.

Indirect effects on sacred sites and traditional use areas can include the presence of non-native species and any other activities that may be seen as degrading to either the sacred nature of a place or to the experience of conducting traditional activities there. They can also take the form of conflicts with other recreational or economic uses that affect the ability of traditional practitioners to access these areas.

Cumulative Effects

Cumulative effects include the direct and indirect effects of the proposed action and alternatives when added to all past, present, and reasonably foreseeable future actions. Since site condition assessments for heritage resources are not available for any time prior to the introduction of European livestock species to the Southwest, some level of effect is assumed to have contributed to the current condition of all sites on the allotment. Given the non-renewable nature of heritage resources – prehistoric as well as historic archaeological sites - any portion of a given site either damaged or removed diminishes its cultural and scientific value permanently. Therefore, all effects to heritage resources are considered cumulative.

Some of the actions that have affected the condition of heritage resources in the past include:

Past and current grazing: Past grazing actions have resulted in soil erosion and compaction while current management has, in some cases, prevented or slowed recovery.

Natural and Prescribed Fire Suppression: A long history of fire has altered the characteristics of many ecosystems from what they were in the archaeological and historical past. Fire suppression has likewise damaged archaeological sites and modified historic landscapes.

Historic juniper treatments (mostly Chrysotile).

Mining: A long history of mining has also directly impacted archaeological sites and altered environmental contexts.

Some of the activities with a potential to affect heritage resources foreseeable in the future for the Salt River EIS Project Area include:

- Small, dispersed mines (active and inactive) and mining related activities (all allotments)
- *Comprehensive Environmental Response Compensation Liability Act* site (Chrysotile); asbestos clean-up site
- Recreation camping (all allotments)
- Public sand and gravel removal pits (multiple allotments)
- Off-road travel for game retrieval during hunting seasons (all allotments)
- Thinning to protect communication sites (multiple allotments)
- Prescribed fire and managed fire activities (Sevenmile burn; most allotments)
- Unauthorized off-road ATV and UTV travel by recreationists
- Introduction and spread of noxious weeds by hikers, vehicles, domestic animals, etc.
- Timber Camp Woodland Restoration Project (Chrysotile)
- Unauthorized livestock from adjacent allotments and other lands (all allotments)
- Motocross trials (Sedow)
- Proposed housing development (Chrysotile)

Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects), are likely to have no effect on heritage resources, particularly as all surface disturbing activities are required to undergo an evaluation and determination of effect under Section 106 of the *National Historic Preservation Act*, as regulated under the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities between the USDA Forest Service Region 3, the State Historic Preservation Officers of Arizona, New Mexico, Texas, and Oklahoma, and the Advisory Council on Historic Preservation*, signed December 24, 2003. Implementation of the protocols contained within this agreement would help to attain the desired future condition for these resources.

Environmental Consequences - Alternative 2 (Current Management)

Direct Effects

Direct effects to archaeological and historical resources, especially archaeological sites, can be generally defined as anything that results in the removal of, displacement of, or damage to artifacts, features, and/or stratigraphic deposits of cultural material. In the case of heritage resources which are considered eligible for inclusion in the National Register of Historic Places, this can also include alterations of a property's setting or context. In the case of traditional cultural properties and sacred places, additional considerations may include alterations in the presence or availability of particular plant species. Archaeological and historical, depending on their nature and composition, are subject to several different types of impact from activities associated with grazing. Direct impacts from grazing are generally considered to be those resulting from concentrated livestock trampling or construction. For the most part, these conditions tend to be associated with the construction of range improvements designed to provide water or to concentrate and hold stock for roundup or shipping. Thus, the greatest potential for direct adverse effects to heritage resources is associated with the construction of range improvements, primarily

stock tanks and other livestock watering features, corrals, and the access roads needed to build and maintain them.

Direct effects to sacred sites and traditional use areas can be generally defined as anything that results in removal of, displacement of, or damage to the physical features of the landscape associated with the traditional use or alteration of the vegetative composition of the area in the case of collecting sites. Grazing has the potential to create those kinds of impacts. Direct effects can include alterations of a sacred site's setting or context, sometimes to the extent that they are no longer recognizable and the various landscape features associated with their past use cannot be relocated. Grazing practices that result in erosion and changes in vegetative composition and density or alterations in the presence or availability of particular plant species can be especially damaging to traditional collecting areas.

Indirect Effects

Indirect effects on archaeological and historic sites can include erosion and changes in vegetative composition and density that alter the setting and geographic context of sites.

Indirect effects on sacred sites and traditional use areas can include the presence of non-native species and any other activities that may be seen as degrading to either the sacred nature of a place or to the experience of conducting traditional activities there. They can also take the form of conflicts with other recreational or economic uses that affect the ability of traditional practitioners to access these areas.

Cumulative Effects

Since site condition assessments for heritage resources are not available for any time prior to the introduction of European livestock species to the Southwest, some level of effect is assumed to have contributed to the current condition of all sites on the allotment. Given the non-renewable nature of heritage resources – prehistoric as well as historic archaeological sites - any portion of a given site either damaged or removed diminishes its cultural and scientific value permanently. Therefore, all effects to heritage resources are considered cumulative.

Nevertheless, based on a history of observation and consultation with the State Historic Preservation Officer (SHPO), managed grazing is not considered in and of itself to constitute an effect on heritage resources when the grazing strategy is designed to match herd size with capacity and distribute livestock as evenly as possible across the allotment in order to avoid localized concentrations of animals and the resultant impacts to soils and vegetation associated with intense trampling. Changes in grazing strategy that do not increase grazing intensity or increase stocking rates are likewise not considered to have an effect provided that whatever new strategy is implemented does not alter these conditions.

Direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (cumulative effects) as listed above, may result in most heritage resources moving increasingly away from what are considered desired conditions, but, since no increase in grazing intensity is proposed, are considered to have no effect on heritage resources. All other surface disturbing activities, such as facilities construction and maintenance, are required to undergo an evaluation and determination of effect under Section 106 of the *National Historic Preservation Act*, as regulated under the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities* between the USDA Forest Service Region 3, the State Historic Preservation Officers of Arizona, New Mexico, Texas, and

Oklahoma, and the Advisory Council on Historic Preservation, signed 12/24/2003, specifically Appendix H, the *Standard Consultation Protocol for Rangeland Management*. Implementation of this protocol would help to attain the desired future condition for these resources.

Environmental Consequences - Alternative 3 (Proposed Action)

See effects for alternative 2.

Cumulative Effects

See effects for alternative 2.

Adverse effects can be foreseen if a proposed grazing strategy were to introduce livestock into an area not known to have been grazed historically. They may also be expected when a grazing strategy proposes shifting to a more intensive system where higher permitted numbers or high intensity/short duration schedules would concentrate livestock into confined areas where either the absolute or relative stock density would cause a significant increase in surface disturbances due to trampling that would be above previous or existing levels. This could result in either direct or indirect adverse effects depending on the degree of trampling resulting from localized concentration and on the presence or absence of heritage resources in the concentration area, the nature of the resource and its resistance to such impacts, and the distance to other heritage sites.

Despite the fact that, as with alternative 2, all surface disturbing activities are required to undergo an evaluation and determination of effect under Section 106 of the *National Historic Preservation Act*, as regulated under the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities* between the U.S. Forest Service Region 3, the State Historic Preservation Officers of Arizona, New Mexico, Texas, and Oklahoma, and the Advisory Council on Historic Preservation, signed December 24, 2003, specifically Appendix H, the *Standard Consultation Protocol for Rangeland Management*, the direct and indirect effects of grazing management under this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), would likely result in most heritage resources moving increasingly away from what are considered desired conditions, particularly if grazing intensity is increased. In general, under alternative 3, effects on heritage resources are more pronounced than alternative 2 and much more pronounced than alternative 1.

Environmental Consequences - Alternative 4 (Habitat Optimization)

See effects for alternative 2.

Air Quality

Existing Condition Air

Air quality for the analysis area is monitored by Arizona Department of Environmental Quality under direction from the *Clean Air Act* and Environmental Protection Agency, who provide National Ambient Air Quality Standards (NAAQS). The analysis area is not in a nonattainment area or maintenance area for regulated air pollution but nonattainment areas exist nearby. Action alternatives and the No Grazing Alternative are expected to have a minimal effect on air quality (ADEQ 2011).

Desired Condition Air

Projects related to the Proposed Action, alternative 3, and No Grazing Alternative are subject to NAAQS and should strive to keep particulate matter within those standards during normal operations or special projects.

Effects

Particulate matter (10 microns and smaller) dispersed during activities associated with livestock grazing management can penetrate human and animal lungs. Inhaling particulate matter 2.5 microns and smaller has been linked to increases in death rates, heart attacks, plaque and clotting, respiratory infections, asthma attacks, and cardiopulmonary obstructive disease (ADEQ 2011). Effects can be mitigated through proper site preparation and construction techniques and through site restoration following ground-disturbing activities. These effects could occur during livestock gathering (heavy trailing, increased vehicle movement) and during construction of range improvements. Effects would be minimized under a No Grazing Alternative without livestock gathering and trailing; however, use of roads in the area would still occur and construction of improvements for wildlife or recreational benefit could still occur on the allotment. Air quality would still be affected by activities on other active grazing allotments in the analysis area and by continued recreation and mining operations in the project area and just outside the project area.

Air quality may also be temporarily affected during managed wildland fire and prescribed fire activity. Air quality is monitored by Arizona Department of Environmental Quality as described above and effects within project airsheds are regulated through NAAQS. Smoke produced during prescribed fires is mitigated through implementation of ADEQ rules and Best Management Practices identified in project burn plans. Information about rules can be found at [Arizona State Smoke Management](#).

Climate

Existing Condition

Climate on these allotments is characterized by a bimodal precipitation pattern with about sixty percent occurring as frontal systems in winter from December to March and about forty percent occurring as monsoons in summer from July to September. Summer storms can be more intense than winter storms, but are generally of shorter duration and smaller aerial extent.

According to Arizona Drought Monitor Report (ADWR 2012), Arizona remains in a long-term drought, which has likely had an effect on the allotments. According to NO PROJECT AREA National Climatic Data Center data, there has been a marked upward trend in the globally averaged annual mean surface temperature since the mid-1970s (Shein 2006). Models used by Seager et al. (2007) to predict how climate change will affect the southwestern United States indicate this region has begun the transition to a dryer climate which will continue into the 21st century. However, the models are too broad-scale to predict how climate change might affect monsoons, which contribute 40 percent of the total annual precipitation received on the Tonto National Forest (Lenart 2005).

Nearest climate gauges to the project area with current data are Miami and Roosevelt 1WNW. The period of record for Miami is 1914 to present and the average annual precipitation is 18.85 inches (WRCC 2011). The data indicate six of the last ten years (2001-2010) had below average precipitation, with 2002 being below 50 percent of average, two years (2005 and 2010) were above average and two years had missing data (WRCC 2011).

The period of record for Roosevelt 1WNW is 1905 to present and the average annual precipitation is 15.85 inches (WRCC 2011). The data indicate seven of the last ten years (2001 to 2010) have had below average precipitation, with 2002 being below 50 percent of average. Three years (2005, 2008, and 2010) had above average precipitation (WRCC 2011). For the same years, the temperature was above average eight of the years and below average two of the years (WRCC 2011).

Desired Condition

U.S.D.A. Strategic Plan for 2010 to 2015 sets a departmental goal to “ensure our national forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources.” As a measure of this goal, all National Forests are to come into compliance with a climate change adaptation and mitigation strategy. The Plan and A Roadmap for Responding to Climate Change has been developed and is available on the agency’s website at [U.S. Forest Service Climate Change](#).

The Roadmap integrates land management, outreach, and sustainable operations accounting. It focuses on three kinds of activities: assessing current risks, vulnerabilities, policies, and gaps in knowledge; engaging partners in seeking solutions and learning from as well as educating the public and employees on climate change issues; and managing for resilience, in ecosystems as well as in human communities, through adaptation, mitigation, and sustainable consumption strategies. To measure agency progress in moving toward this goal, a Performance Scorecard has been implemented.

Effects

Research indicates livestock grazing may affect climate through emissions of methane gas produced by cattle (Gill et al. 2010). This effect is anticipated to be minor in the analysis area as cumulative livestock numbers are low and distributed broadly across the landscape for all grazing allotments in the project area. It would be difficult to separate effects of livestock emissions from those produced by other human activities, such as passenger vehicles and off-road vehicles traveling on roads in the analysis area, industrial activities such as mining, and outflow from major metropolitan areas such as Phoenix, Arizona, which lies approximately 90 miles west of the analysis area.

Livestock grazing may or may not affect climate by altering the abundance or type of carbon-sequestering vegetation available on the landscape (Brown et al. 1997, Asner et al. 2004, and Archer and Predick 2008). Implementation of Best Management Practices and utilization guidelines is anticipated to mitigate this effect across the analysis area.

Climatic fluctuations, on the other hand, can have a profound effect on livestock grazing. Implementing an adaptive management strategy will be critical for responding to these fluctuations by adjusting stocking rates as needed in periods of below average or above average precipitation to meet desired conditions for all resources.

Removal of livestock from the allotments through selection of a No Grazing Alternative would reduce emissions slightly however it would be difficult to measure this change. Emissions would continue to be generated from neighboring allotments in the analysis area. Eliminating grazing pressure on vegetation may also have a slight benefit for carbon sequestration; again, this would be difficult to measure on such a small scale.

Socioeconomics

Affected Environment

All of the allotments within the project are located in Gila County, Arizona, on the Tonto Basin and Globe ranger districts. Gila County encompasses approximately 4,758 square miles. In 2010 Gila County had a population of 53,597, an increase of 4.4 percent over 2000. Major employment in Gila County includes mining, recreation, ranching and tourism ([Gila County Statistics](#)).

Within the county, ownership or administrative control occurs as follows: the U.S. Forest Service - 56 percent of the land, Apache Tribe - 38 percent, individuals and corporations - 2 percent, U.S. Bureau of Land Management - 2 percent, the state of Arizona and other public lands the remaining 2 percent (Arizona Department of Commerce 2008). With little private land to assess property taxes, the county is dependent upon funding from the federal government. The U.S. Government makes payments to Gila County under various programs, the two most important being:

- Payments in Lieu of Taxes (PILT). These payments are made to the local governments based upon the acreage of federal land within the county, population, consumer price index and previous year payments. In 2010, Gila County received approximately \$3,108,571 from this program (U.S. Dept. of Interior 2011 [[Payments in Lieu of Taxes](#)]).
- *Secure Rural Schools and Community Self Determination Act of 2000* (PL 106-393). Traditionally, the federal government had returned 25 percent of the revenues collected on Forest Service lands from grazing permits and timber sales to the counties on which these revenues were generated. With decreased timber sales and fees generated from grazing permits, the above Act was designed to “...restore stability and predictability to the annual payments made to States and counties containing National Forest System lands and public domain lands managed by the Bureau of Land Management for use by the counties for the benefit of public schools, roads and other purposes.” In 2011 Gila County received \$1,693,792 from this program (Gila County 2011).

A summary of economic benefits from recreational activities in the project area can be found in the Recreation existing condition description of this document.

Social Environment

The social environment is perhaps the most diverse and emotionally charged arena in ecosystem management. The social environment for this analysis comprises the people living in and adjacent to the Tonto National Forest. Forest resources play an important social role for the people of the Southwest. The goods, services, and uses available from the National Forests represent major components in the lives of many residents within the area of the Tonto National Forest, especially those in rural areas.

Geographically this region has two types of very distinct population centers. There are several small rural communities scattered along and within the boundaries of the Forest. In addition, the Phoenix metropolitan area abuts the Forest along its western boundary. The smaller communities tend to rely at least partially on Forest resources (mining, ranching, and timber) for their economic development. This is evidenced by the Gila County Land Use and Resource Policy Plan (2010) for public lands, which states, “Federal and state agencies need to recognize and take into account the critical role that public lands in Gila County play in the overall functioning of the County, and in the County’s economy and tax base.” The Phoenix metropolitan area and Tonto

Basin area have experienced great population growths in recent years. The influx of people in recent decades has also brought about more diverse views and public opinion regarding appropriate uses of the public lands. The demand for recreational type activities on public lands is greatly increasing.

Few generalizations can be made about the communities across the Southwest. They are as diverse as the people who live there and due to the increasing desirability of the Southwest as a living location. The diversity is ever increasing. It should not be expected that all residents have the same or even similar points of view on various issues.

Lifestyles

Ranching and the grazing of domestic livestock have been a part of the Southwest culture for 400 years. Grazing sheep and cattle in the Southwest was introduced by the Spanish in the late 16th century. The tradition of an open range endured for several hundred years before Anglo-Americans arrived in the Southwest, and when they came, the new arrivals expanded the traditional pastoral practices into modern range-cattle and sheep industries. In the Southwest, the National Forests were of equal or greater importance to the people for their range resources as they were significant for timber, watershed or mineral resources (Baker et al. 1988).

Economic Impacts

Other than reported actual livestock numbers (from bills for collection) that have been placed on the six allotments within the project area, data has not been provided to the Forest Service in regards to the economic returns from ranching operations or expenses incurred for maintenance of range improvements. Stocking rates have been variable throughout recent history on the allotments due to fluctuating resource conditions, recurrent drought, and economic considerations.

Research is available that discusses the influence stocking rates can have on economic returns. Generally, heavier stocking rates result in the greatest gross economic returns, while moderate stocking rates maximize net economic returns (Holechek et al. 2004). Over time, heavy stocking tends to result in higher death loss, a greater need for supplemental feeding, especially in years of below average precipitation, and lower weaning weight percentages.

Under heavy stocking rates, livestock tend to make high gains for a few years, especially when precipitation remains at average or above average levels. However, during drier periods, livestock productivity tends to reduce per animal unit and per unit area. The severity of reduction is related to the stocking density i.e., heavier stocking rates result in more severe reductions in economic returns than moderate stocking rates, especially in drought years. Under the adaptive management proposal, desirable stocking rates would be moderate over the long-term to achieve desired resource conditions.

Effects

Environmental Consequences - Alternative 1 (No Action)

A No Grazing alternative would not affect future payments received through PILT or PL 106-393. Globe/Miami and Gila County could be affected by a No Grazing alternative due to the amount of money made by the permittees and how much is spent in the local economy. This is related to a multiplier effect, or that monies made in a community are often re-spent in that community. Multipliers in rural communities are generally lower than for large municipal areas

as expenditures for large ticket items are usually made outside the local area. Multipliers of 1.25 to 1.75 are common in rural areas associated with adjacent public lands (Loomis 1993).

Removal of livestock could result in the loss of some culture and lifestyle tied to ranching. This could intensify feelings of mistrust, loss of personal control, and threaten lifestyles, resulting in negative attitudes towards the Forest Service, and other federal agencies in general.

Conversely, those individuals who perceive grazing to be an unsuitable use of federal lands may feel increased trust and increased positive attitude towards the Forest Service, and other federal agencies in general. These individuals may perceive an increased social benefit from livestock removal.

All permittees in the project area have had or currently have contracts with government, state or local agencies for livestock management plans and range improvements. Removal of livestock and range improvements would affect stipulations of their contracts, potentially requiring financial burden on permittees.

Environmental Consequences - Alternative 2 (Current Management)

Personal characteristics such as self-sufficiency, independence, hard work, and other traits associated with the ranching lifestyle would most likely be protected under these alternatives.

Continuation of ranching operations in a sustainable manner would provide for continuation of the culture and lifestyle tied to ranching in this area.

Conversely, those individuals who perceive grazing to be an unsuitable use of federal lands may feel decreased trust and increased negative attitude towards the Forest Service, and other federal agencies in general. These individuals may perceive a decreased social benefit from continuing grazing or expanded grazing.

Federal, state and local contracts would be maintained, providing improved management possibilities for livestock operators.

Environmental Consequences - Alternative 3 (Proposed Action)

Same as described for alternative 2 with expanded opportunities to increase revenue through access to more locations within the project area.

Environmental Consequences - Alternative 4 (Habitat Optimization)

Effects would be most similar to alternative 1 even though an opportunity to graze would still be provided. Moving from a yearlong grazing operation to a seasonal grazing operation may result in drastic changes to the type of herd each operation is managing. Traditional cow-calf herds may be replaced with yearling herds, if permittees are not able to find pasture for cattle they wish to keep during summer months. Having to sell herds in the spring and purchase new cattle in the fall could pose an economic hardship depending upon market prices. It would become economically infeasible for permittees to maintain or add range improvements to allotments.

Environmental Justice

Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Toward attaining environmental justice for all communities and persons in the United States, *Executive*

Order 12898 (February 11, 1994) directed all Federal agencies to evaluate their proposed actions to determine the potential for disproportionate adverse impacts to minority and low-income populations.

In the memorandum to heads of departments and agencies that accompanied *Executive Order 12898*, the President specifically recognized the importance of procedures under NEPA for identifying and addressing environmental justice concerns. The memorandum states that “each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by NEPA.”

Implementation of any alternative evaluated in this EA would not result in adverse impacts to human health or socioeconomic factors. Therefore, disproportionate direct, indirect, or cumulative adverse impacts on low income or minority populations would not occur.

Short-term Uses and Long-term Productivity

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Descriptions of relationships and environmental consequences of short-term uses and long-term productivity can be found in chapter 3 for resources within the project area.

Under the *Multiple-Use Sustained Yield Act* and the *National Forest Management Act*, all renewable resources are to be managed in such a way that they are available for future generations. Short-term uses, and their effects, are those that occur annually or within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Domestic livestock grazing can be considered a short-term use of a renewable resource. As a renewable resource, forage on rangelands can be sustained if the long-term productivity of the land is maintained. This long-term productivity is maintained through application of allowable utilization, stream bank disturbance levels, and allotment management plan guidance described in chapter 2. These protection measures are also discussed throughout this chapter, in particular for soils, water quality, vegetation, and wildlife.

Unavoidable Adverse Effects

Implementation of any action alternative may cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced, mitigated, or avoided by limiting their extent or duration. The interdisciplinary procedure used to identify specific impact locations was designed to eliminate or lessen the significant adverse consequences. The application of Forest Plan standards and guidelines, best management practices (BMPs), project-specific design criteria, and monitoring are all intended to limit the extent, severity, and duration of potential effects. Such

measures are discussed throughout this chapter. Regardless of the use of these measures, some adverse effects may occur. The purpose of this chapter is to fully disclose those effects.

Alternative 1 - No Action/ No Grazing: adverse effects to livestock permittees and their economic well-being would occur.

Alternative 2 - Current Management: limited adverse effects to soils and vegetation would continue to occur in areas where livestock concentrate (around water developments, salting grounds, loafing sites).

Alternative 3 - Proposed Action: adverse effects to threatened, endangered, and sensitive wildlife and plant species as listed in chapter 3 should not occur along Upper Salt River and in upper Oak Creek Mesa Pasture because action would be mitigated through conservation measures as described in chapter 2 or in the preferred alternative. Localized adverse effects to soils would continue as described under Current Management.

Alternative 4 - Habitat Optimization: adverse effects would be similar to or less than those described for Current Management.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

Mitigation measures for cultural resources and threatened, endangered or sensitive species would prevent any irreversible commitments of these resources under alternatives 2, 3, and 4.

Under alternatives 2, 3, and 4 temporary irretrievable soil productivity or vegetation commitments may occur at site-specific locations where high intensity grazing occurs, where fire and fuels treatments are applied, and where noxious weeds are treated. These resources would have opportunity to recover when projects were completed or when livestock were not concentrated at specific sites. Irretrievable soil productivity or vegetation commitments may occur where range improvements are installed or where salting occurs. Recovery of resources would be possible if improvements were removed or salting ceased to occur.

Under alternative 3, irreversible localized loss of Southwestern willow flycatcher, Mexican spotted owl, and Chiricahua leopard frog numbers would be possible, although extinction of these species would be unlikely. Habitat related to Management Indicator Species, threatened, endangered, and sensitive species would be removed and/ or quality reduced in areas immediately adjacent to and within ¼ mile of range improvements.

Other resources are protected through mitigation measures described in Chapter 2. Irreversible and irretrievable commitments associated with alternatives considered in this analysis are addressed in detail earlier in this chapter by resource.

Cumulative Effects

Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions (but not speculative), regardless of what agency or person undertakes such other actions. Cumulative effects are the combination of the effects from

other activities that overlap, in time and space, the direct and indirect effects of an alternative. Cumulative effects can result from individually minor, but collectively significant, actions taking place over time (40 CFR 1508.7).

All past, present, and potential future management actions, projects, or other activities, which may result in cumulative effects within the analysis area, are described for each resource analyzed in chapter 3. The effects of many past and ongoing activities (for example, existing range developments, past mining activity, past wildfire rehabilitation) are reflected in the descriptions of current conditions. Only those activities or actions that are likely to result in cumulative effects were discussed in the cumulative effects for each section.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ...other environmental review laws and executive orders.”

Tonto National Forest biologists will prepare a biological assessment and biological evaluation and seek a biological opinion from U.S. Fish and Wildlife Service disclosing effects to threatened and endangered species and conservation measures required to comply with law and policy.

Tonto National forest archaeologists will consult with Tribes and act in compliance with the *National Historic Preservation Act* for any ground-disturbing activity being proposed in this action.

Tonto National Forest will provide a copy of this analysis to the Environmental Protection Agency for review in compliance with the *National Environmental Policy Act*.

Chapter 4: Consultation and Coordination

Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, Tribes and non-Forest Service persons during the development of this environmental assessment:

Interdisciplinary Team Members:

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David Bailey and Jenna Gillis-GIS Specialists, Tonto NF Supervisor's Office
Candy Luhrsen-Writer-editor, Tonto NF Supervisor's Office

Federal, State, and Local Agencies

Arizona Department of Environmental Quality
Natural Resources Conservation Services
Arizona Game and Fish Department
U.S. Fish and Wildlife Service
Southern Gila County Economic Development Corporation
Arizona Cattle Growers' Association
Gila County Cattle Growers' Association
Gila County Board of Supervisors
Salt River Project
Environmental Protection Agency
Bureau of Reclamation
Arizona Department of Water Resources
Arizona Cooperative Extension

Tribes

The Hopi Tribe
Pueblo of Zuni

Chapter 4: Consultation and Coordination

White Mountain Apache Tribe
San Carlos Apache Tribe
Gila River Indian Community
Ft. McDowell Yavapai Nation
Yavapai-Prescott Tribe
Tonto-Apache Tribe
Salt River Pima Maricopa Indian Community

Others

Audubon Society
Sierra Club
Western Watersheds Project
Center for Biological Diversity
Livestock grazing permittees on Globe RD and Tonto Basin RD
Central Arizona Paddler's Club and other river-oriented recreational users
Private landowners within the project area

Distribution of the Environmental Impact Statement

This draft environmental impact statement has been distributed to individuals who specifically requested a copy of the document and those who submitted comments during scoping. In addition, copies of the draft have been sent to Federal agencies, federally recognized Tribes, State and local governments, and organizations representing a wide range of views regarding livestock grazing in the project area as listed above.

Appendix A - Maps

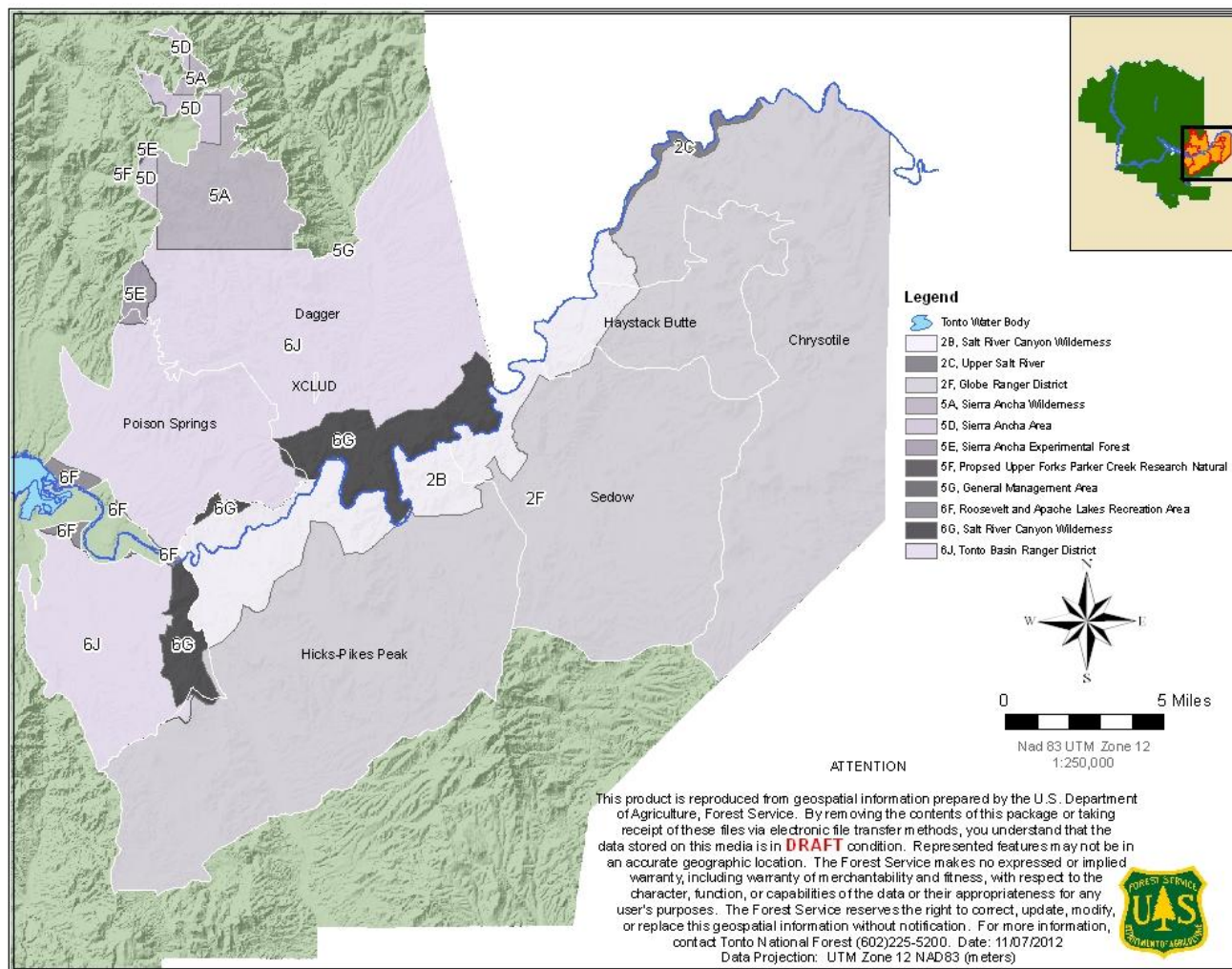


Figure 2: Management Areas

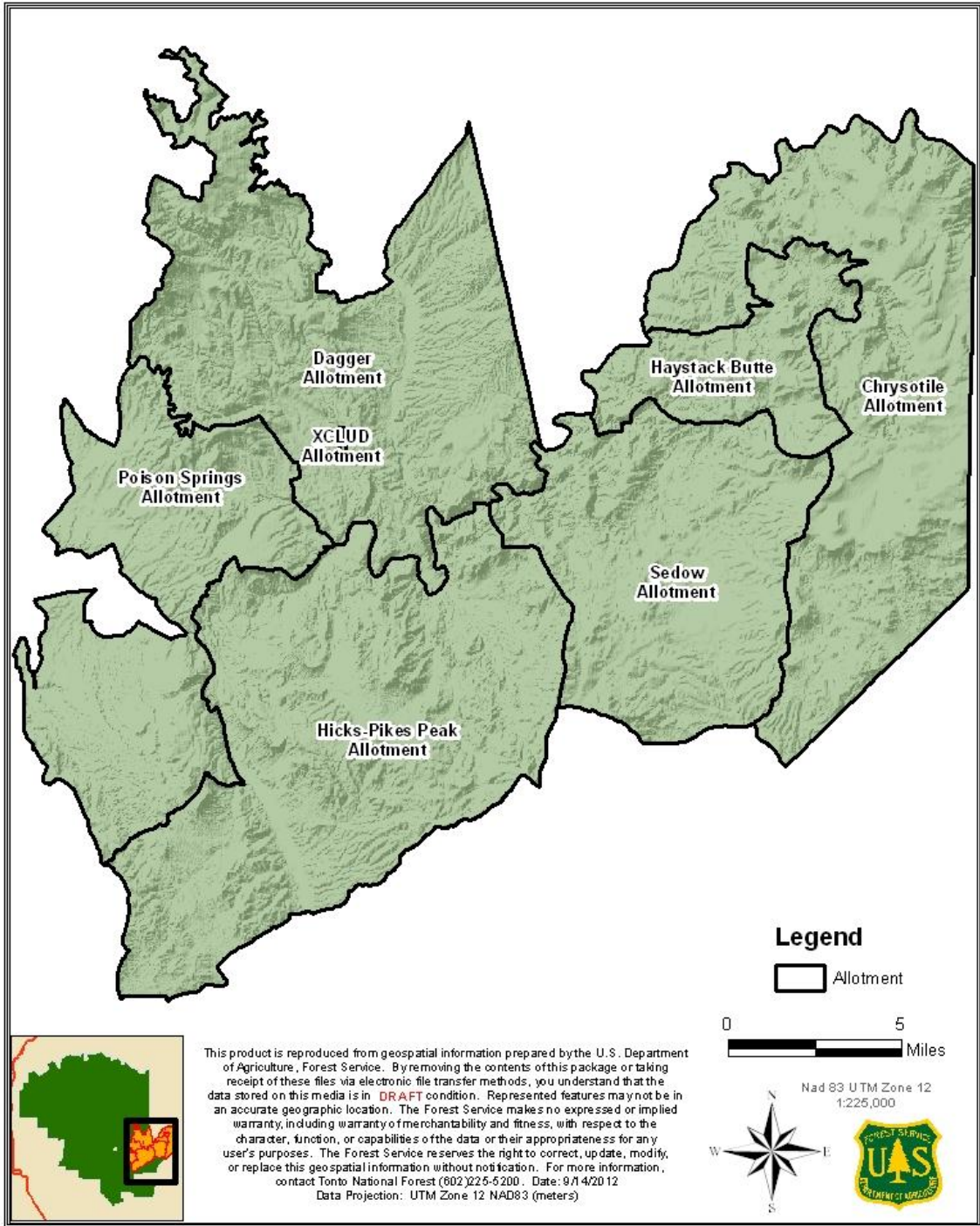


Figure 3: Allotment Boundaries

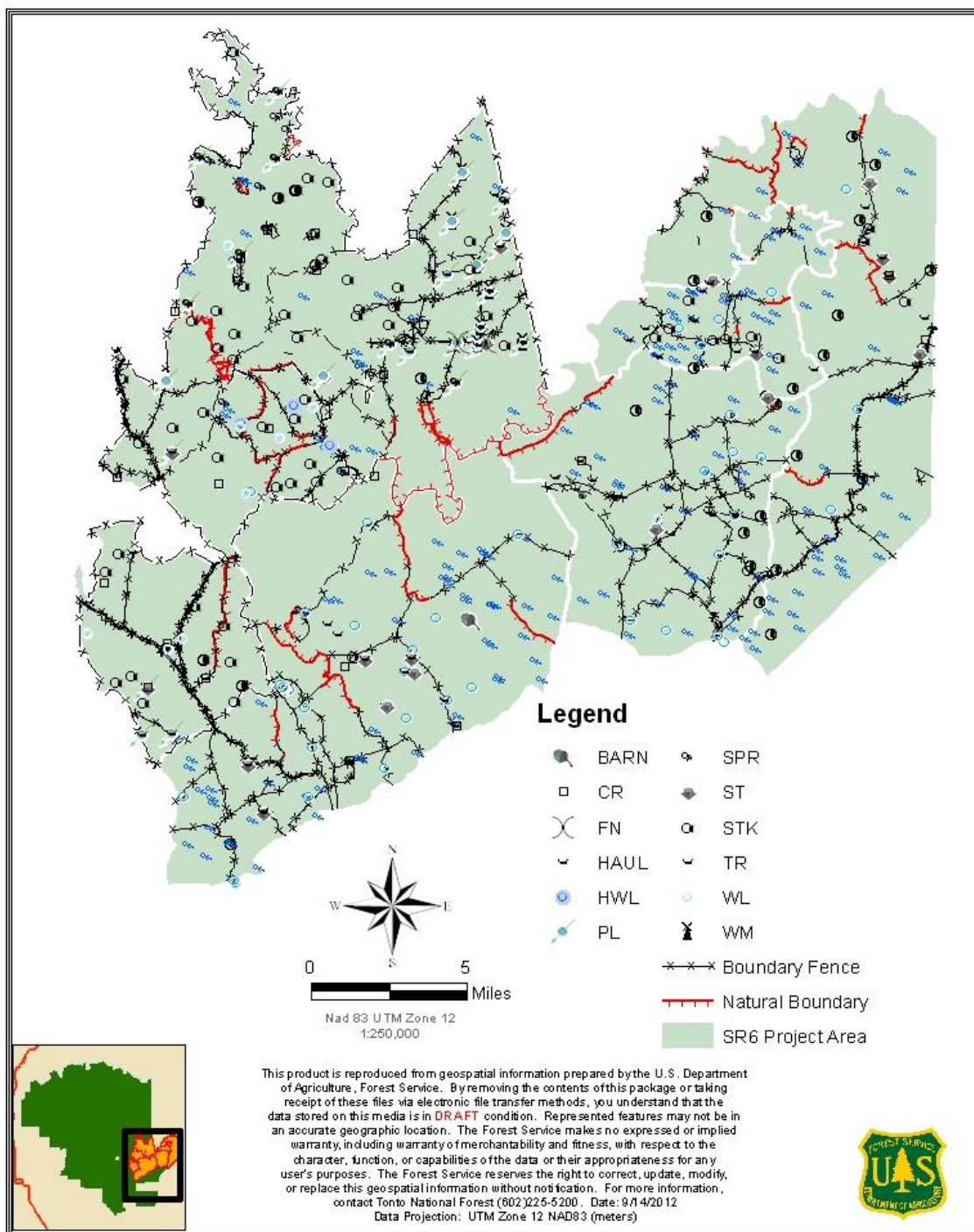


Figure 3a: Existing Range Improvements

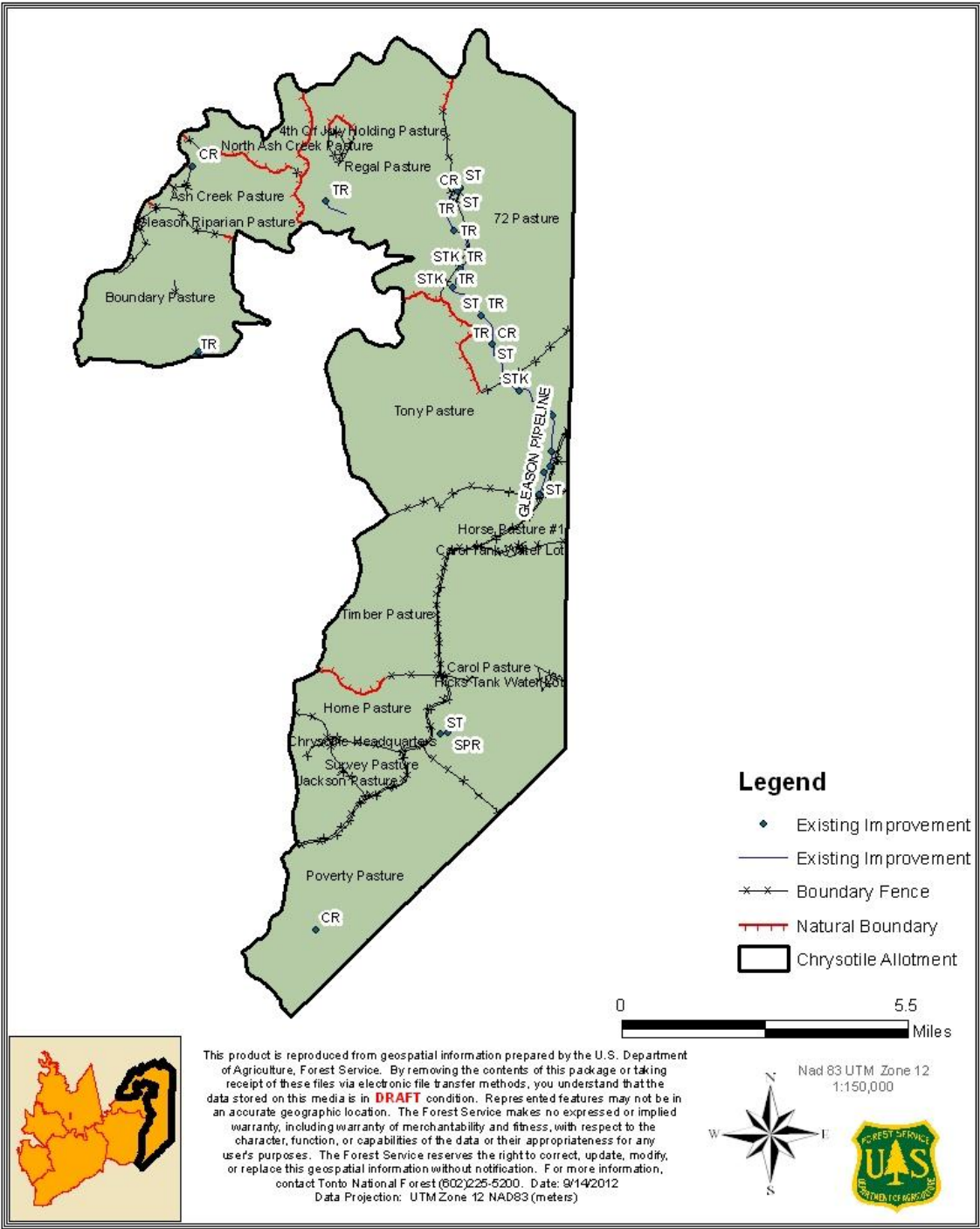


Figure 3b: Chrysotile Allotment Pastures

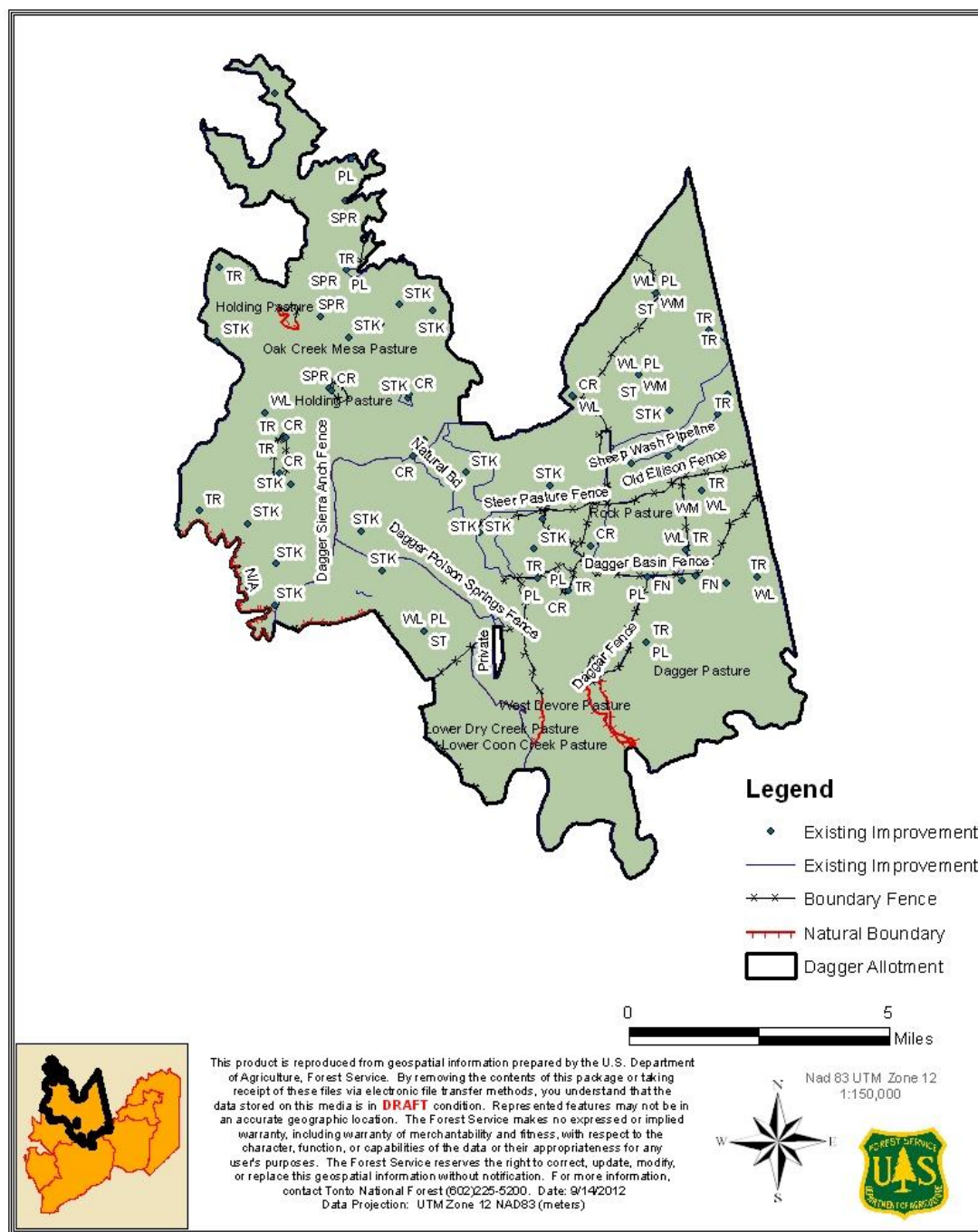


Figure 3c: Dagger Allotment Pastures

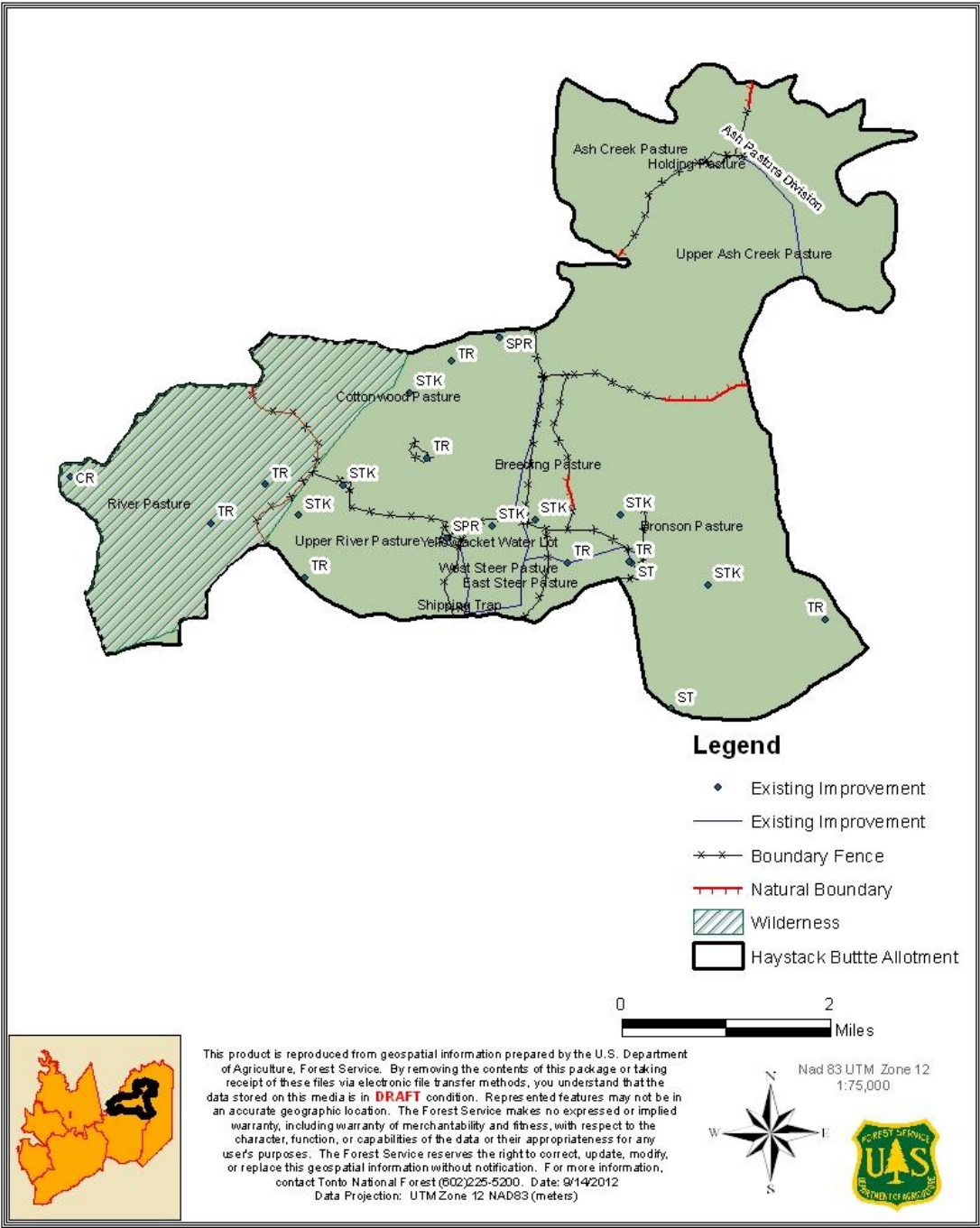


Figure 3d: Haystack Allotment Pastures

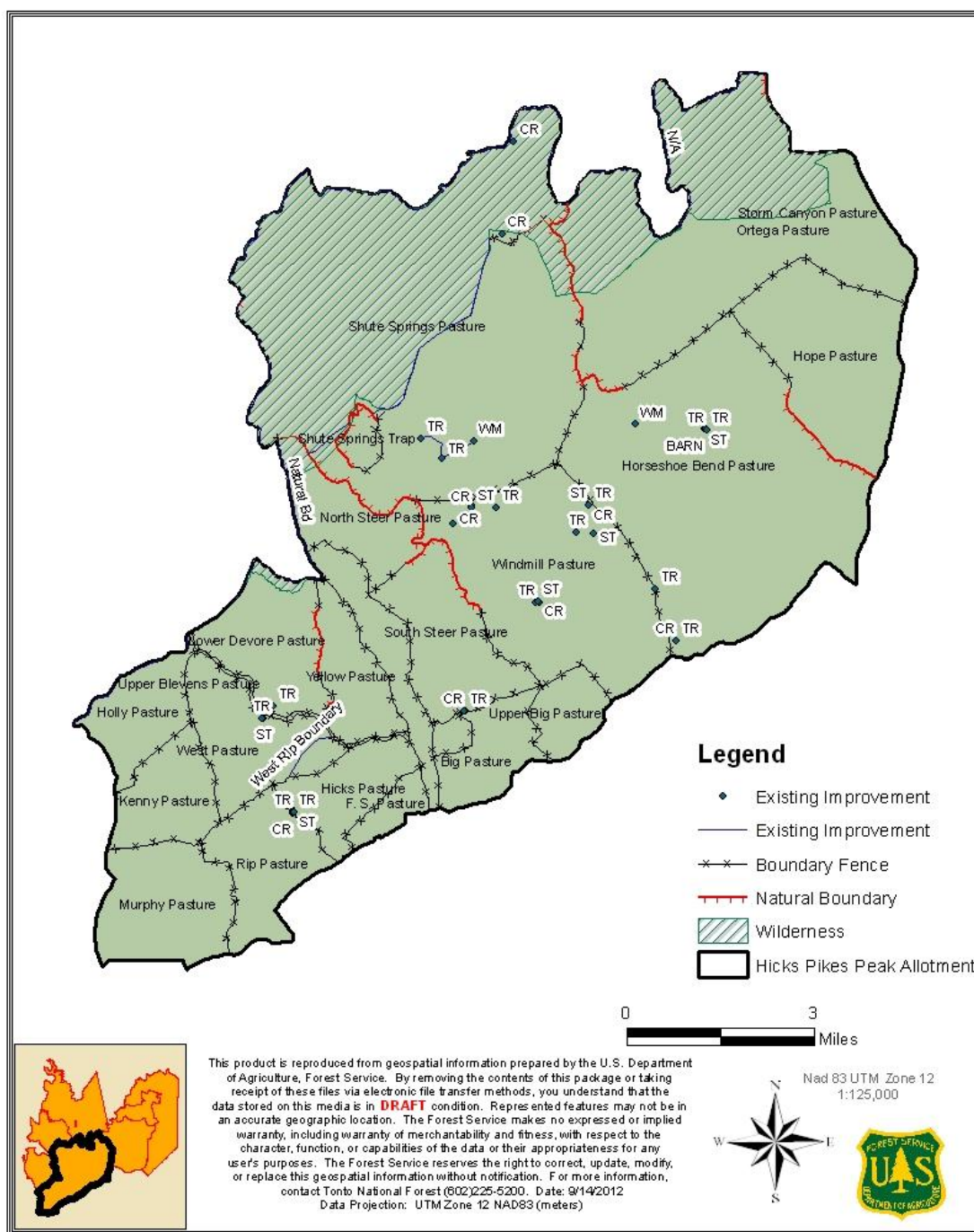


Figure 3e: Hicks-Pikes Peak Allotment Pastures

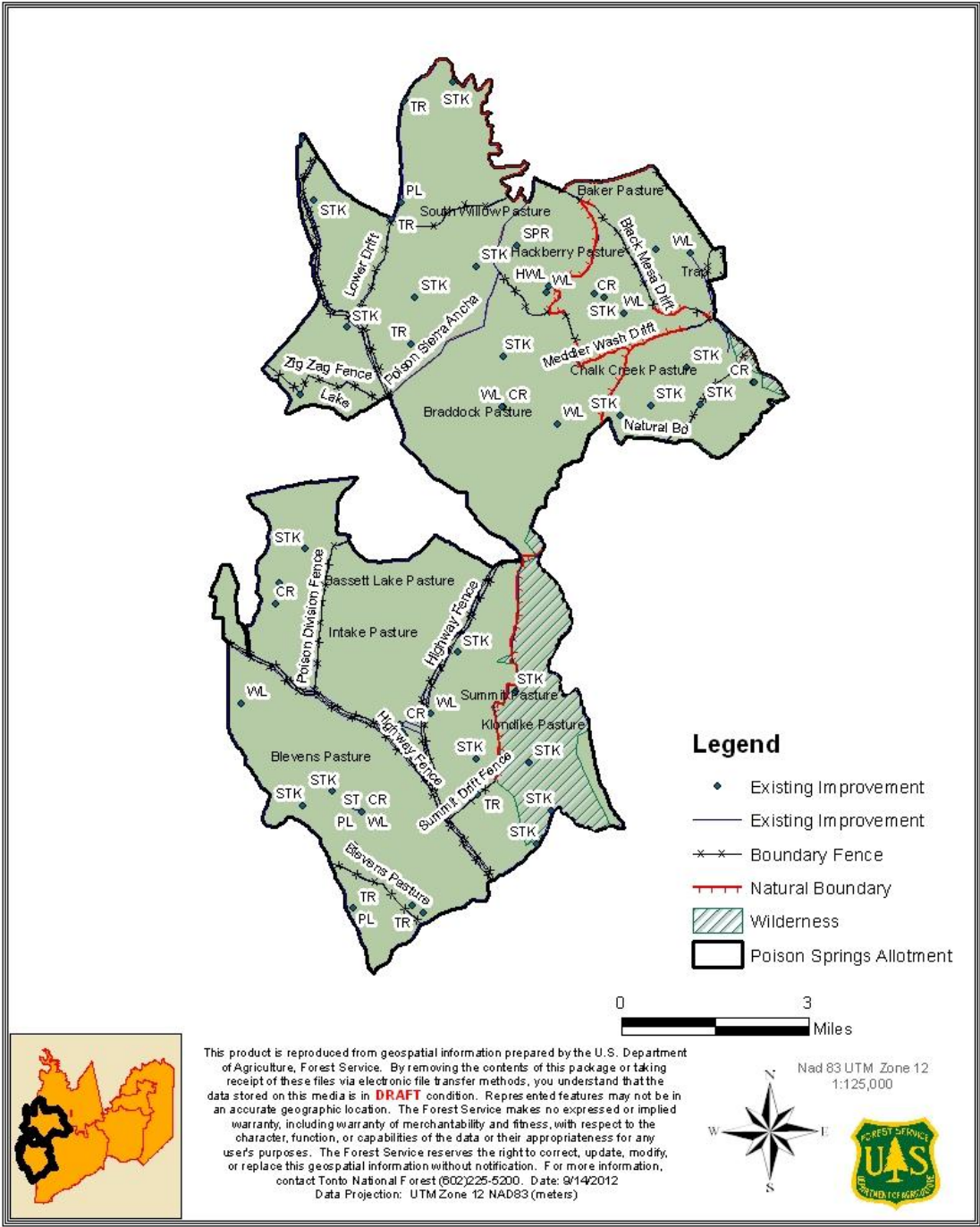


Figure 3f: Poison Springs Allotment Pastures

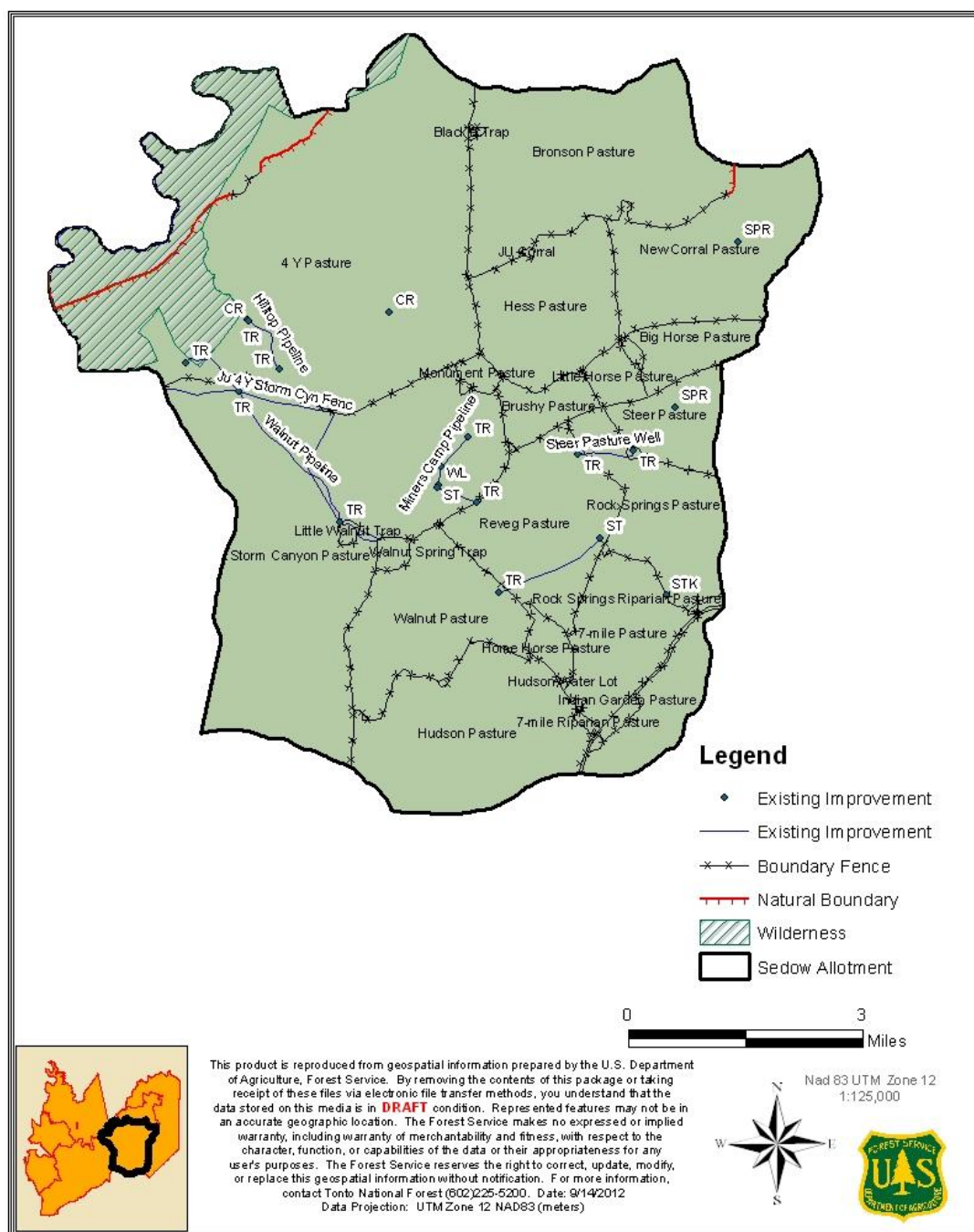


Figure 3g: Sedow Allotment Pastures

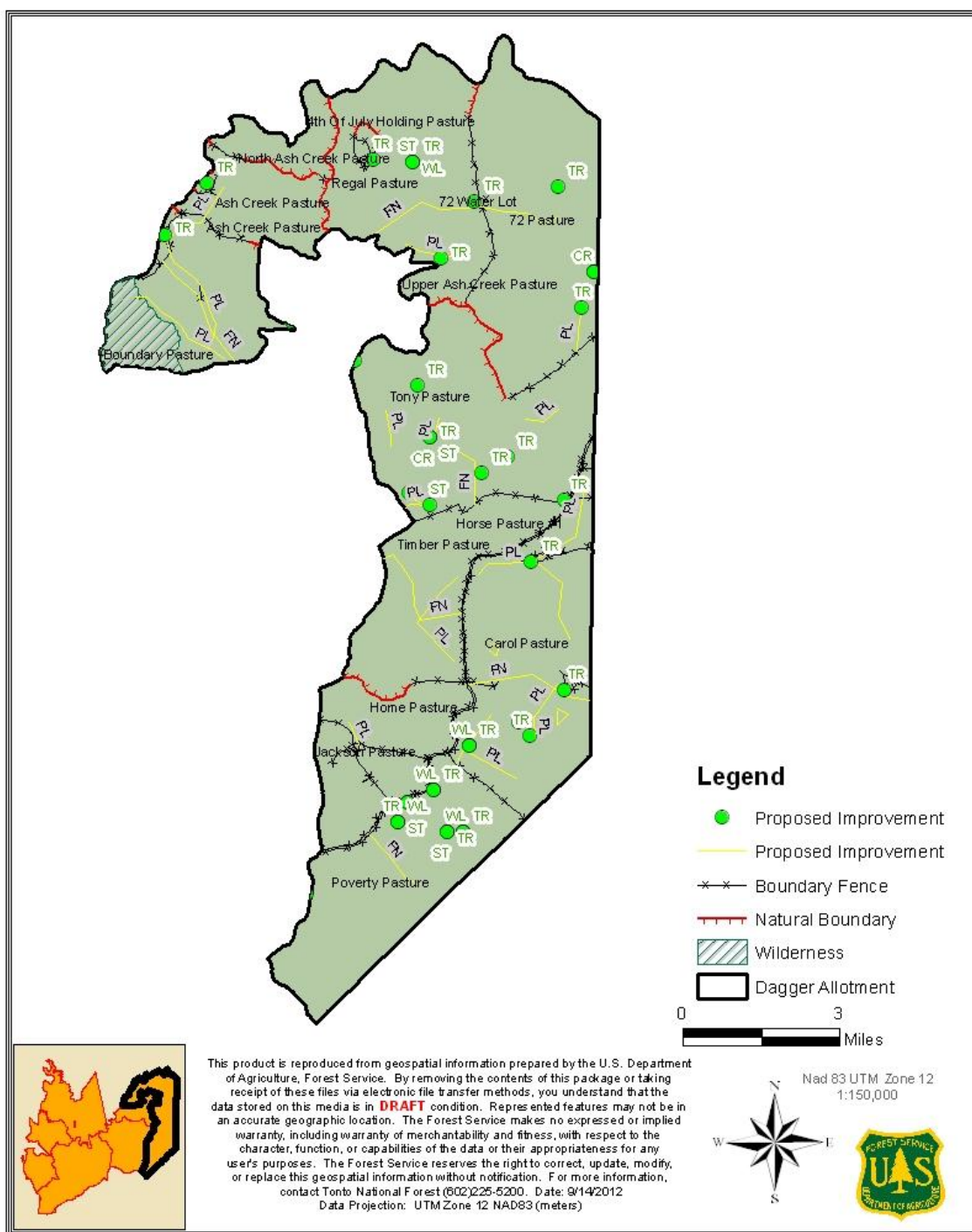


Figure 4a: Proposed Range Improvements- Chrysotile Allotment

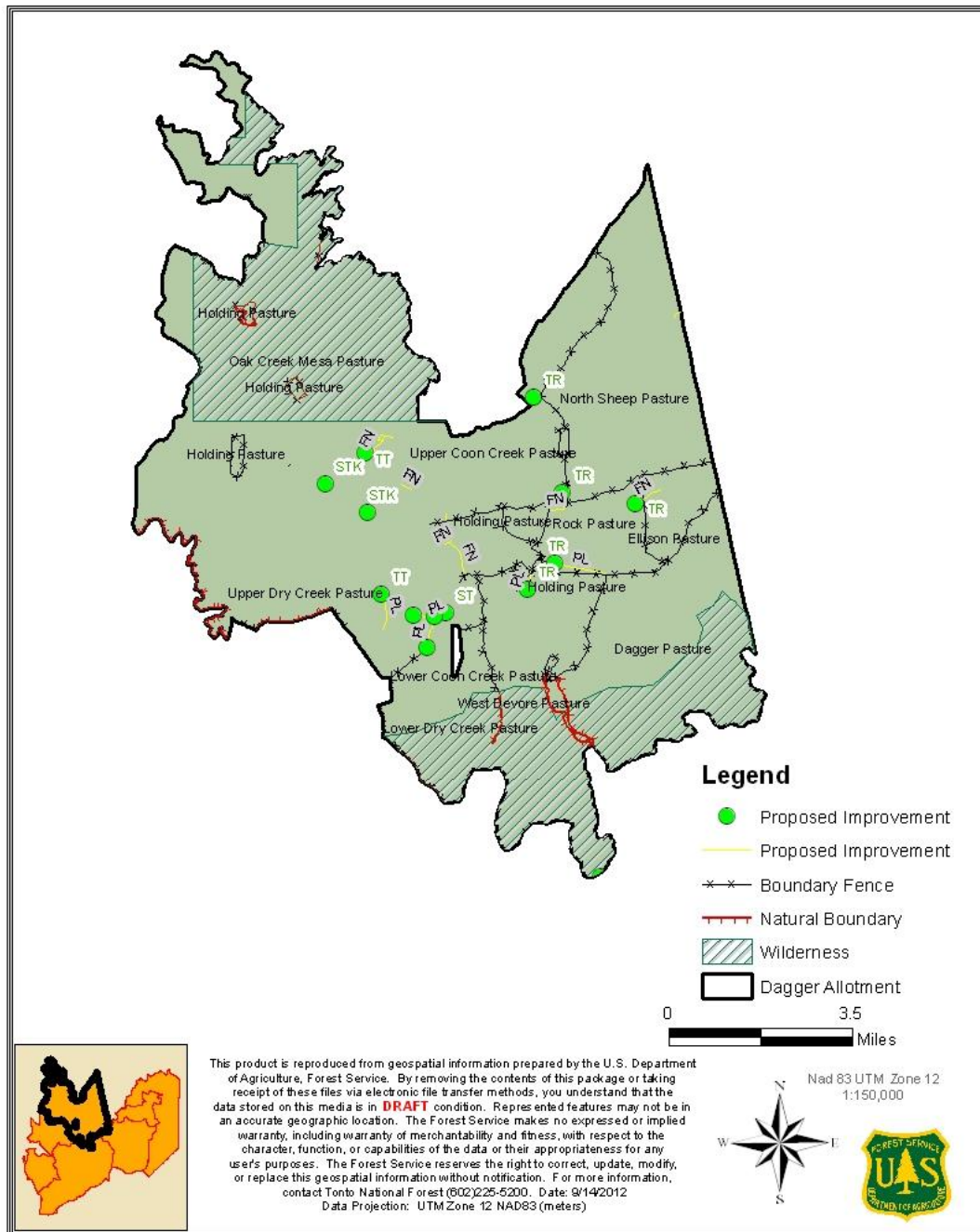


Figure 4b: Proposed Range Improvements- Dagger Allotment

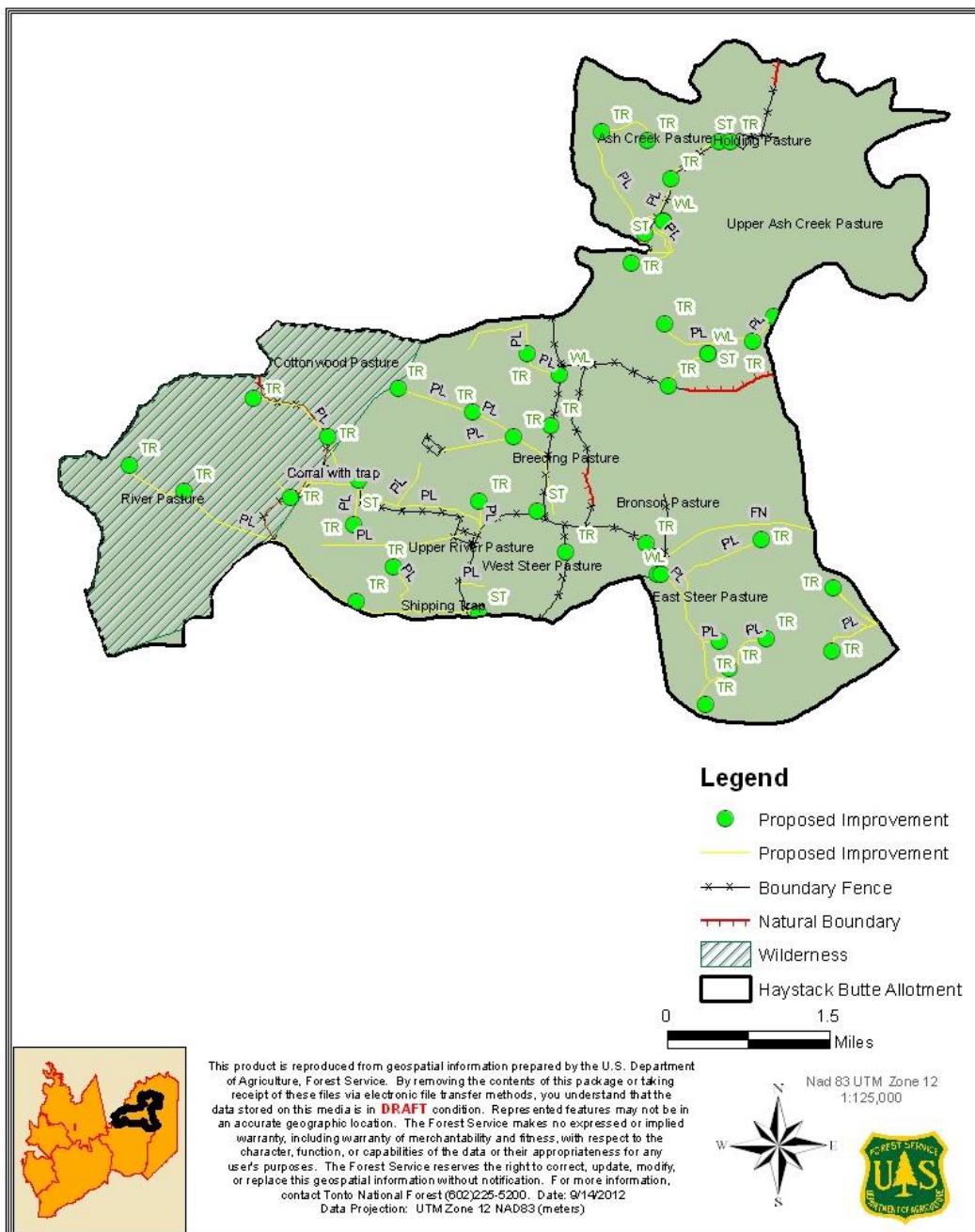


Figure 4c: Proposed Range Improvements- Haystack Butte Allotment

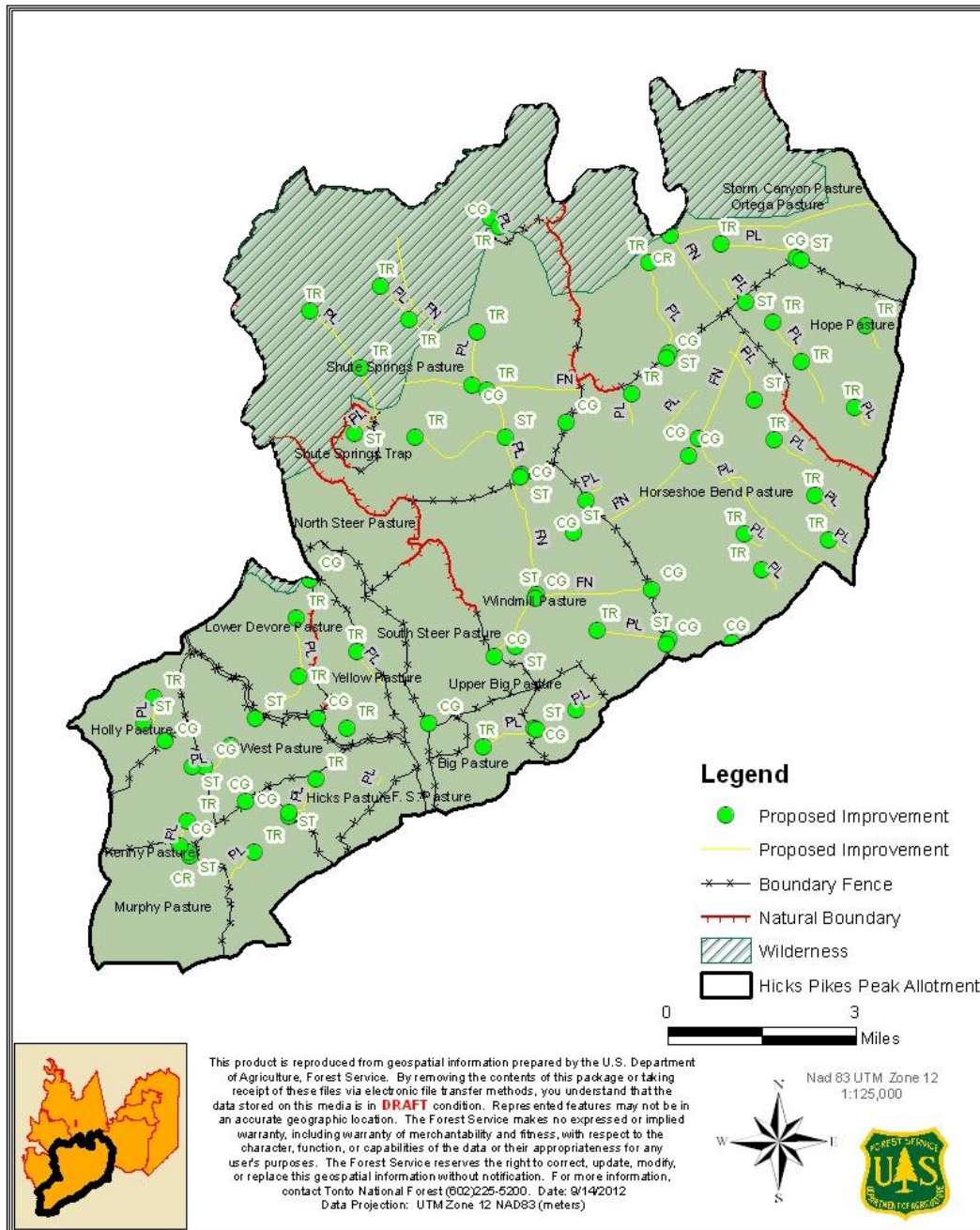


Figure 4d: Proposed Range Improvements- Hicks- Pikes Peak Allotment

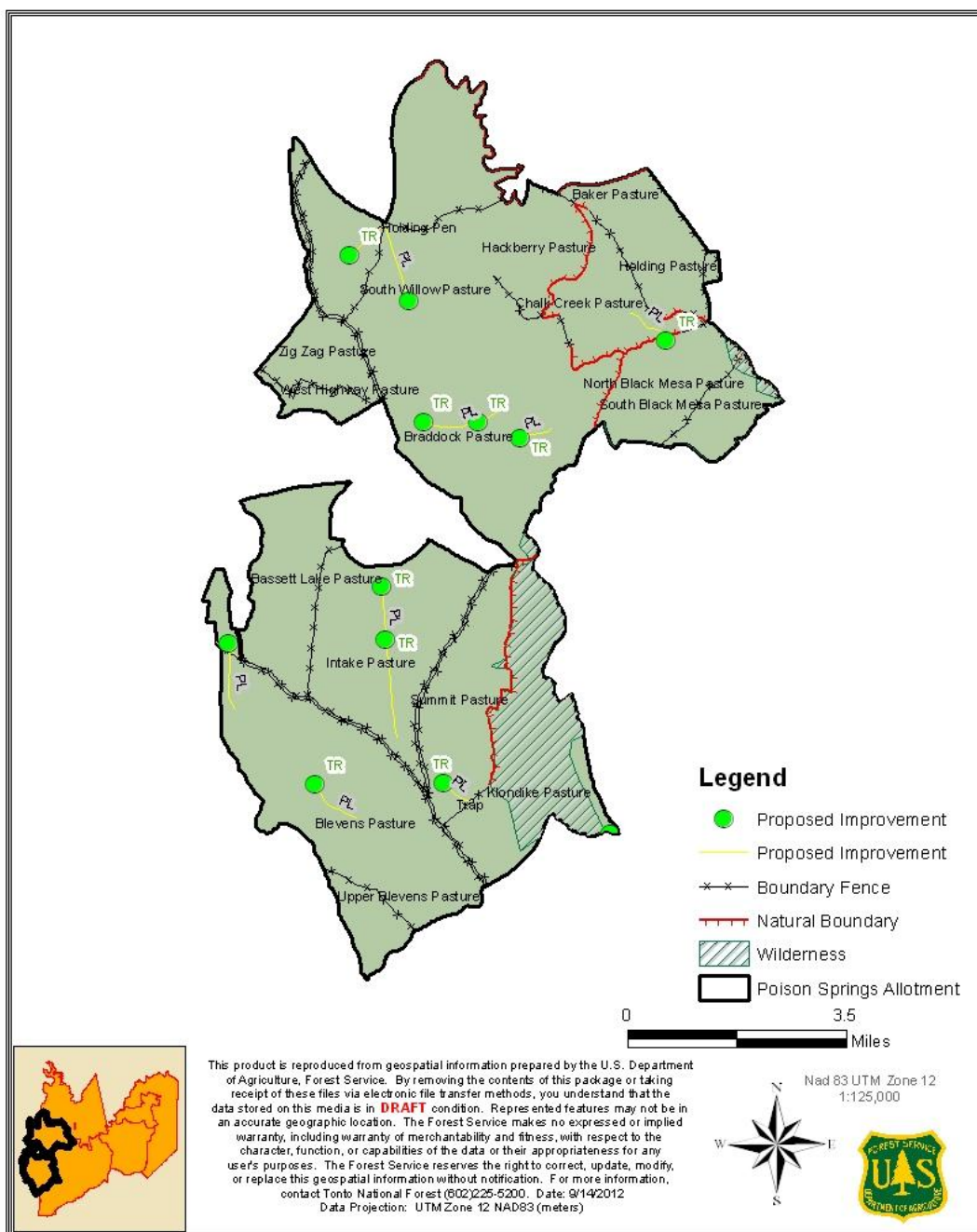


Figure 4e: Proposed Range Improvements- Poison Springs Allotment

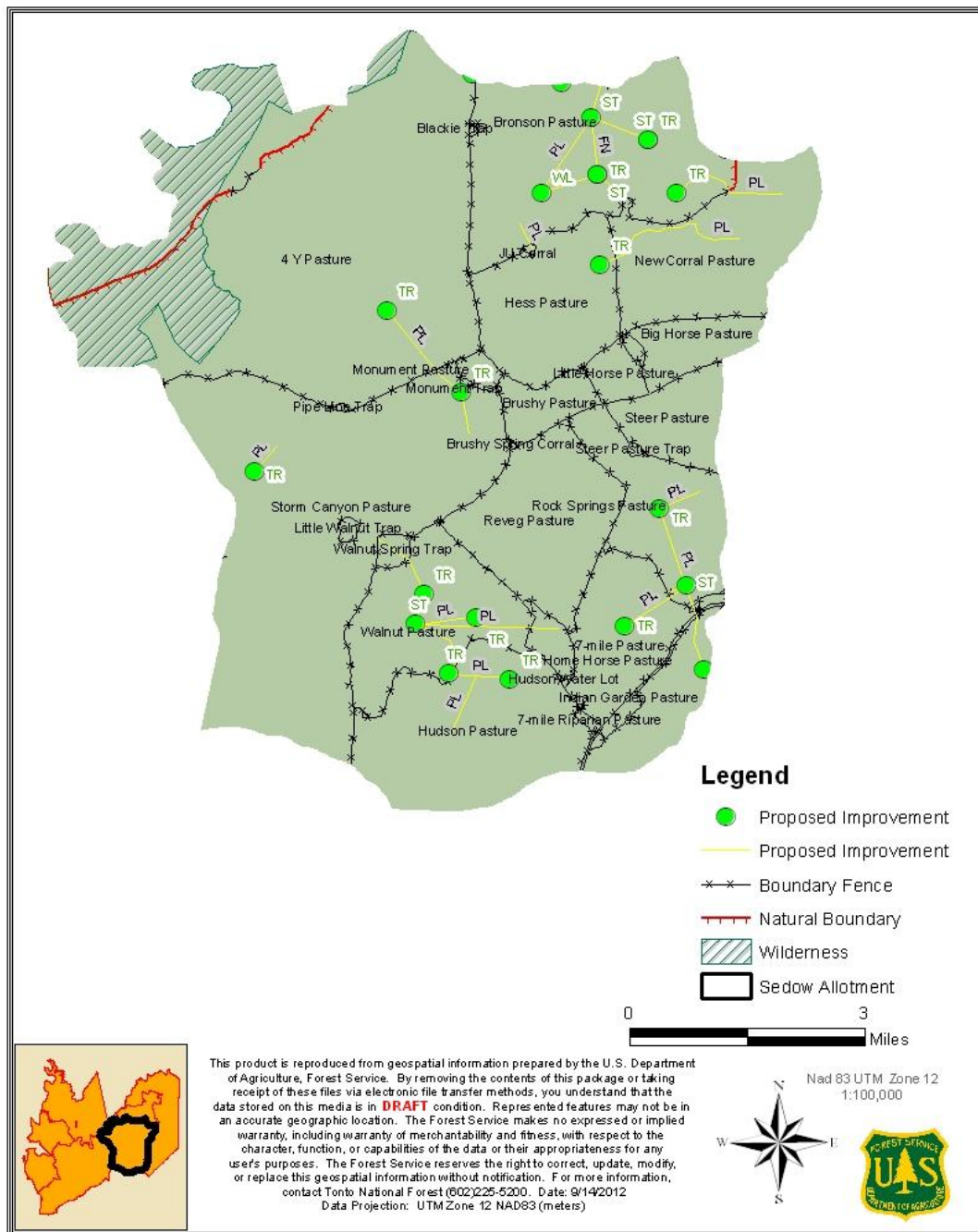


Figure 4f: Proposed Range Improvements- Sedow Allotment

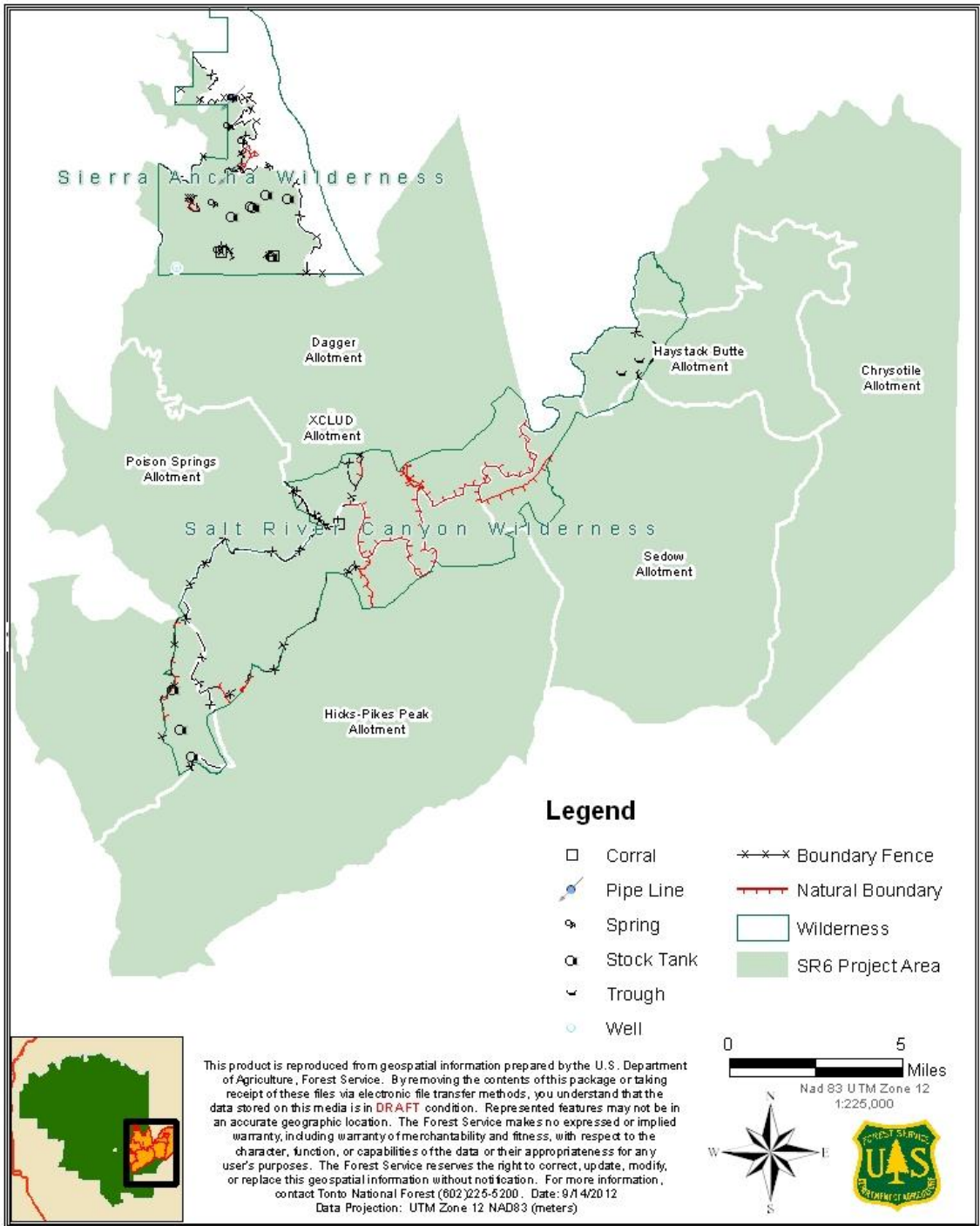


Figure 5: Wilderness Range Improvements

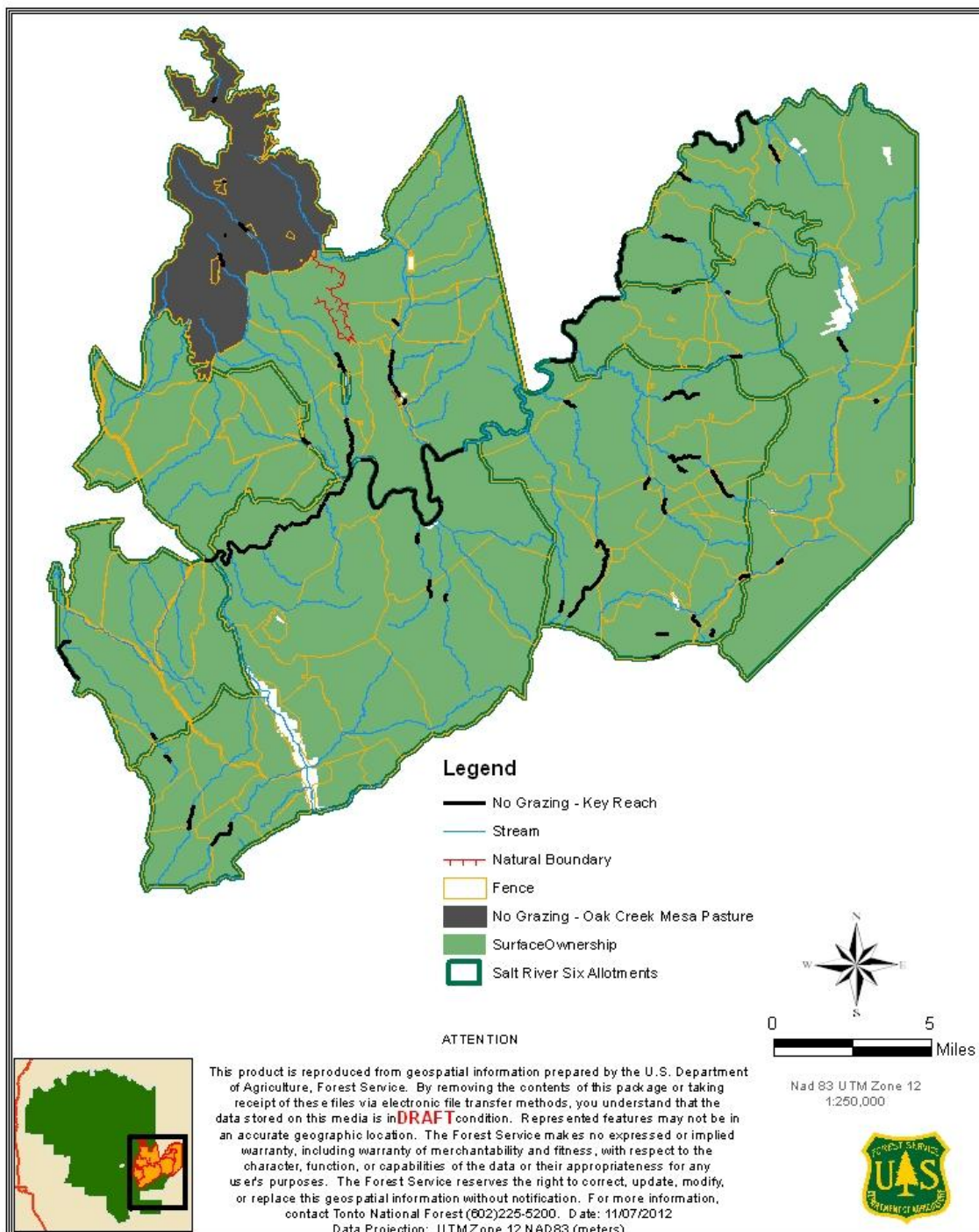


Figure 6: Alternative 4

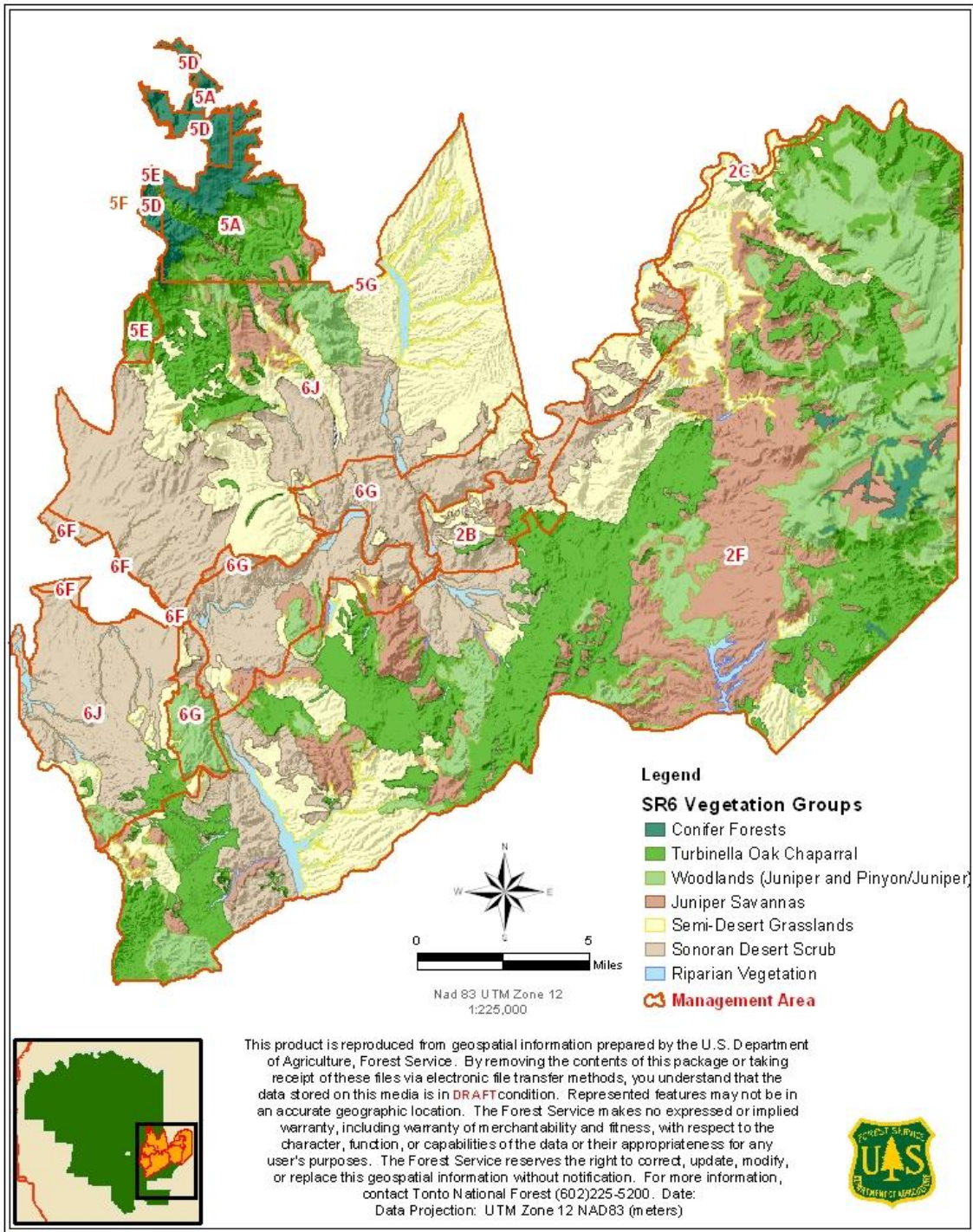


Figure 7: Vegetation Types

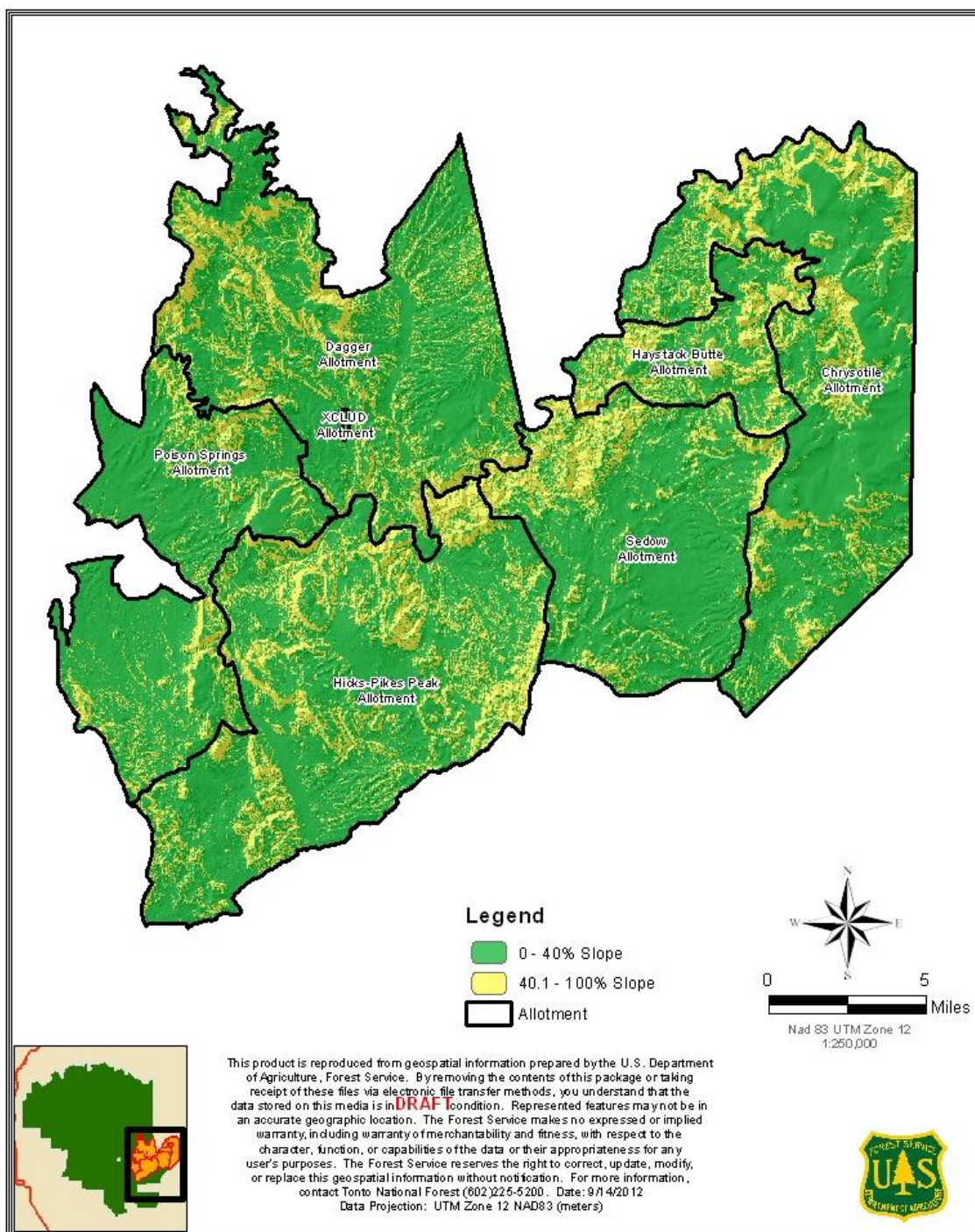


Figure 8: Slopes above and below 40 percent

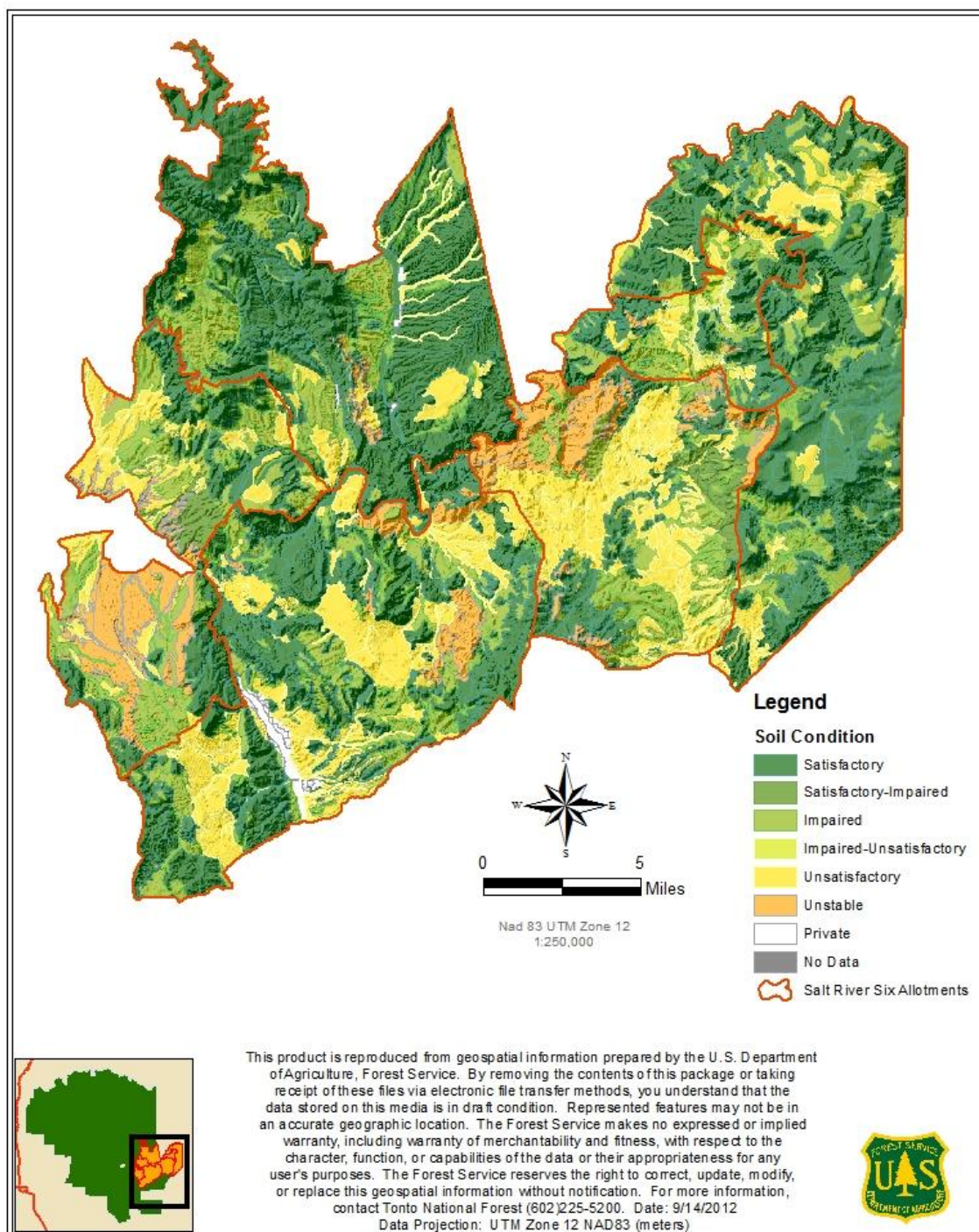


Figure 9: Soil Condition

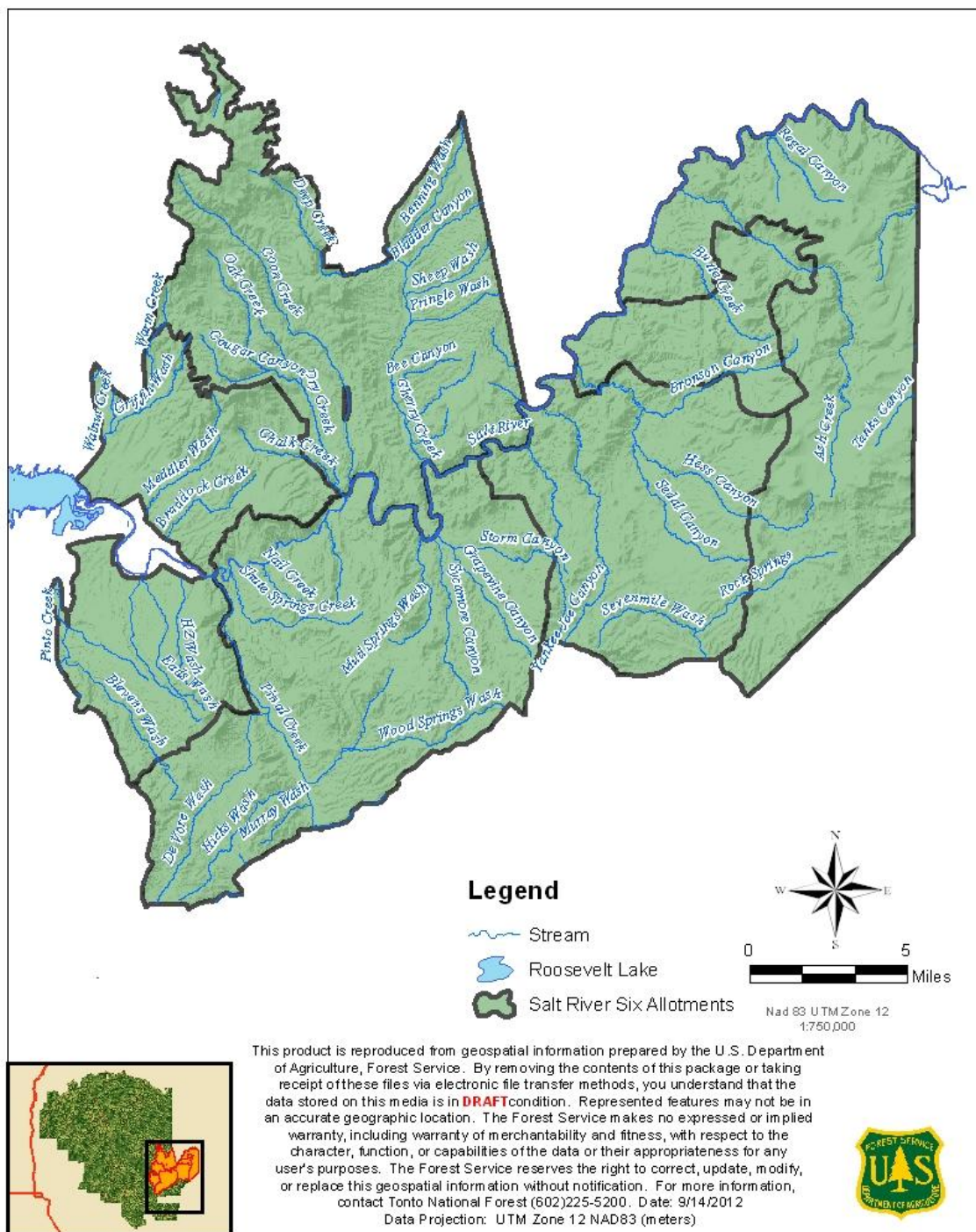


Figure 10: Streams

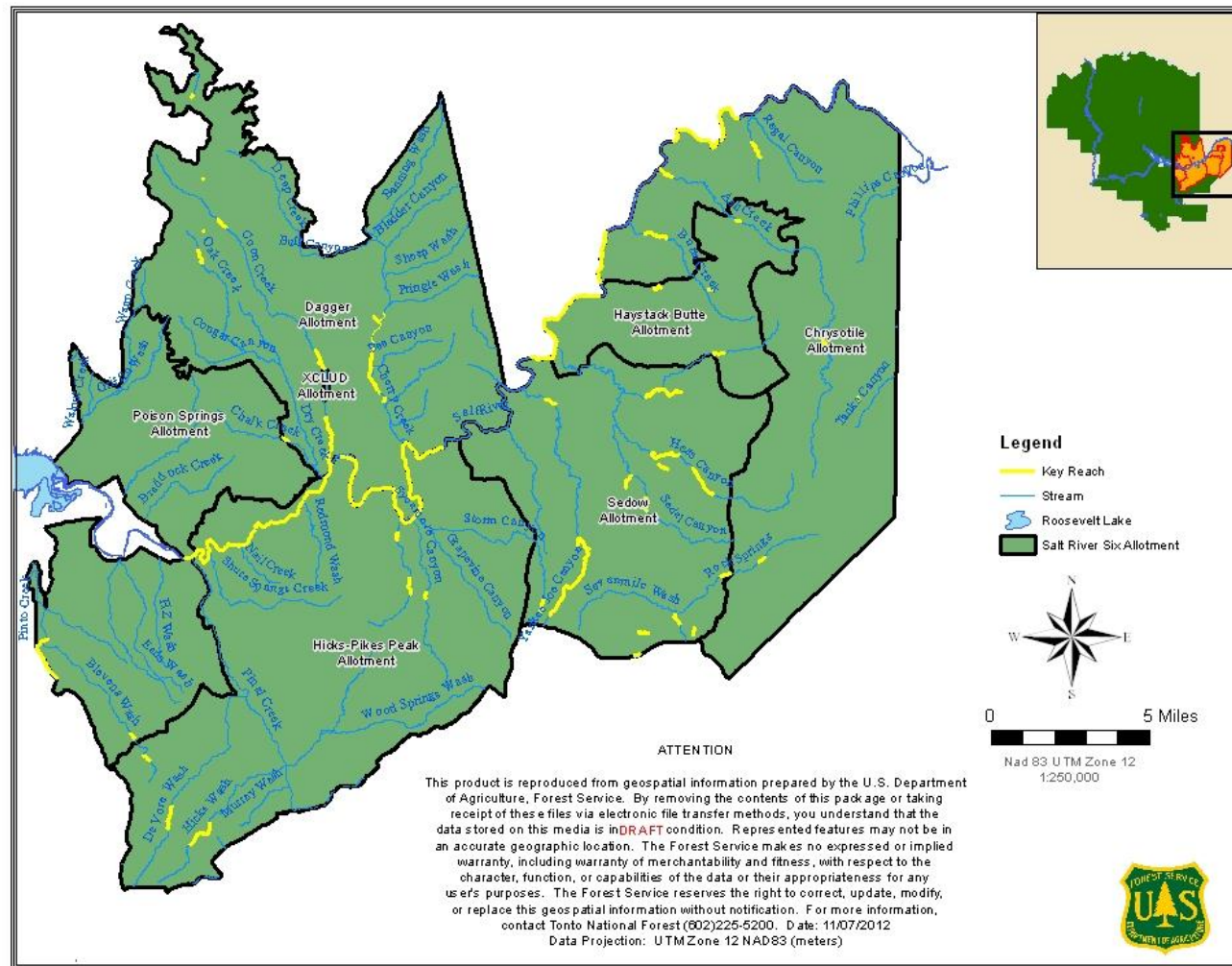


Figure 10a: Key Riparian Reaches

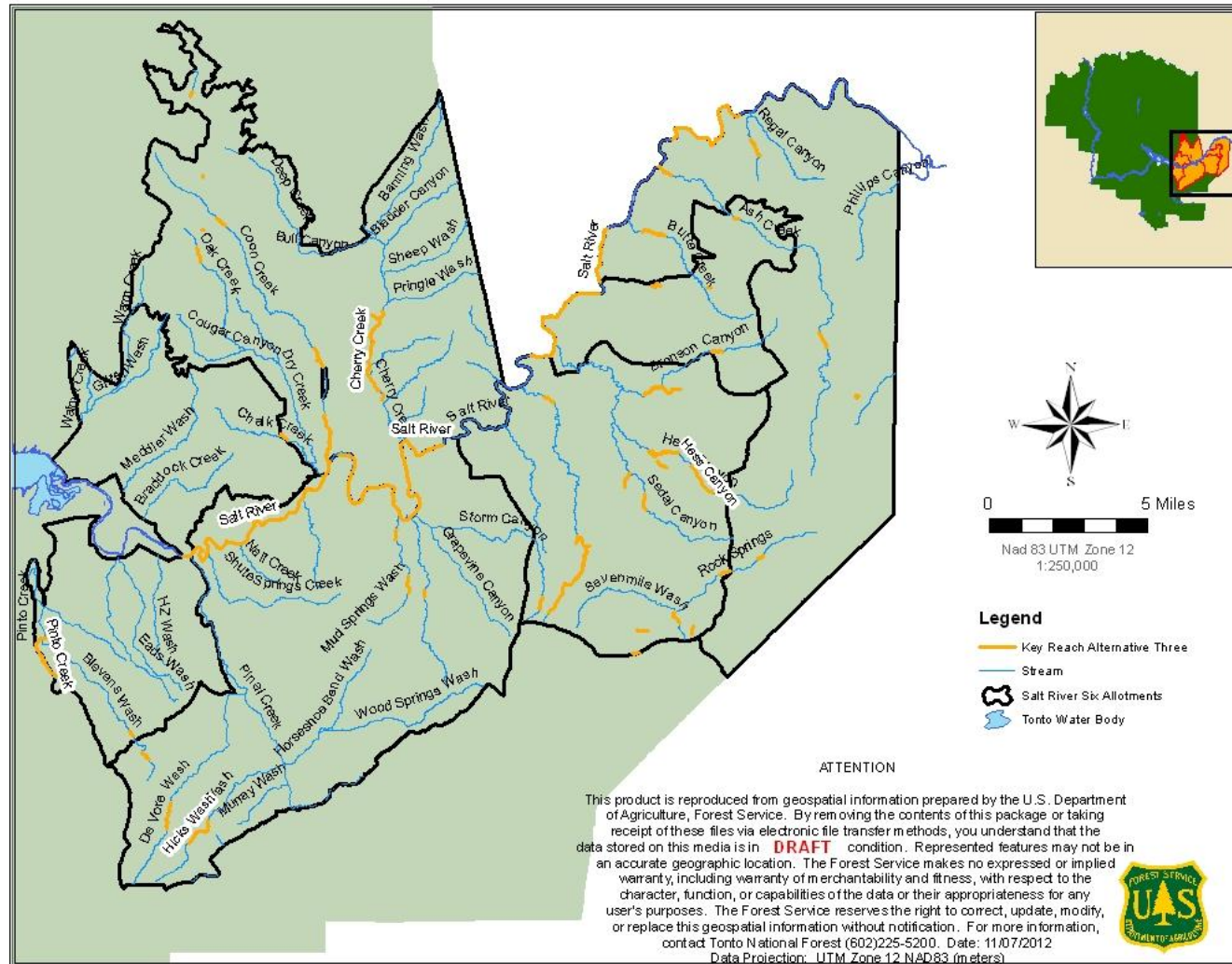


Figure 10b: Key Riparian Reaches

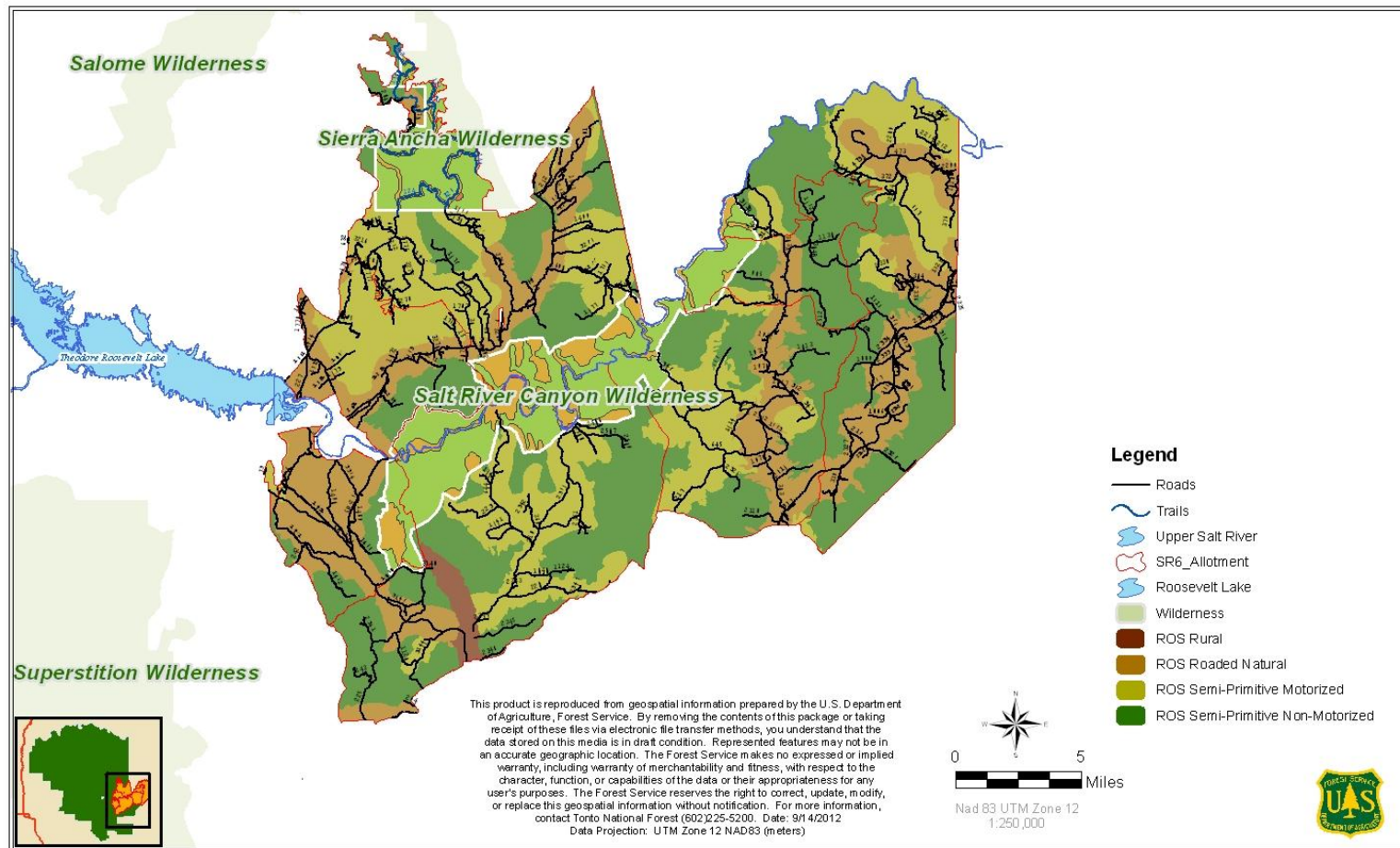


Figure 11: Recreation (Wilderness, ROS, WOS)

Appendix B - Riparian Tables and Supporting Information

Best Management Practices (BMPs)

The BMPs that follow are taken from FSH 2509.22 - Soil and Water Conservation Practices Handbook and will be used to protect soil and water resources. The list contains the objective for each BMP. The handbook also contains an explanation and implementation section for each BMP.

21 - Pesticide Use Management and Coordination

21.11 - Pesticide Application According to Label Directions and Applicable Legal

Requirements: To avoid water contamination by complying with all label instructions and restrictions.

21.12 - Pesticide Application Monitoring and Evaluation: To determine whether pesticides were applied safely, restricted to intended target areas, and deposited at the recommended application rates. To also, evaluate if non-target species were affected. To document and provide early warning of possible hazardous conditions resulting from possible contamination of water or other non-target areas by pesticides. To determine the extent, severity, and probable duration of any potential hazard that might exist.

21.13 - Pesticide Spill Contingency Planning: To eliminate contamination of water that may occur from accidental spills.

21.14 - Cleaning and Disposal of Pesticide Containers: To prevent water contamination resulting from cleaning or disposal of pesticide containers.

21.15 - Streamside and Wet Area Protection during Pesticide Spraying: To minimize the risk of any pesticide inadvertently entering waters or unintentionally altering the riparian area or wetlands.

21.16 - Controlling Pesticide Drift during Spray Application: To minimize the risk of pesticide falling directly into water or non-target areas.

22 - Range Management

22.11 - Controlling Livestock Numbers and Season of Use: Safeguard water and soil resources under sustained forage production. Managed forage utilization by livestock to maintain healthy ecosystems for all resource objectives.

22.12 - Controlling Livestock Distribution: To manage sustained forage production and forage utilization by livestock while protecting soil and water resources. Maintain healthy ecosystems for wildlife and other resources.

22.13 - Rangeland Improvements: To improve, maintain or restore range resources including soil and water through the use of rangeland improvements.

Table 22: Riparian Summary of stream reaches data, including stream type, condition assessment and/or monitoring notes

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
Dagger	Devore	Cherry Creek-upstream of Bee Canyon	8/10/1992	D		Braided channel; light use.
	Rock	Cherry Creek	8/11/1992	D		Stand of cottonwood, willow, sedges, rushes.
	Lower Coon Creek	Coon Creek- from FR 203 to pasture boundary	2/15/2011	B		Seep willow, cattails, horse tails, other sedges/rushes, sycamore.
	Lower Coon Creek	Coon Creek- from FR 203 to pasture boundary	6/22/2000			Sycamores dominate; very little use.
	Lower Coon Creek	Coon Creek- between private property and FR 203	2/15/2011	B/F		Sycamores dominate with some cottonwood and willow, little regeneration, spotty deergrass.
	Lower Coon Creek	Coon Creek- between private property and FR 203	7/9/1998			Channel downcut; no cattle use; recreation use; sycamores dominate, trace deergrass.
	Lower Coon Creek	Coon Creek- between private property and FR 203	9/24/1991	G3		Downcut channel; sycamores dominate.
	Lower Dry Creek	Chalk Creek- below FR 1075	4/27/2011	B	Stable	Thick willows and deergrass.
	Lower Dry Creek	Chalk Creek- below FR 1075	2/26/2002	F	Slightly Impaired	Abundant deergrass, few woody species.
	Lower Dry Creek	Chalk Creek- below FR 1075	2/22/2000			Few deergrass, all grazed to 3 in.
	Lower Dry Creek	Coon Creek- 2 miles upstream from mouth	2/26/2002	B/F	Slightly Impaired	All age classes of woodies present, spotty deergrass, >60 percent bedrock.

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Lower Dry Creek	Coon Creek- 2 miles upstream from mouth	6/15/1992	F3		Sycamore/ash community; transitioning from “G” to “F.”
	Lower Dry Creek	Coon Creek- upstream from mouth	6/22/2000			Dominated by ash and seep willow; little use; thick equisetum.
	Lower Dry Creek	Dry Creek-below wilderness boundary	4/27/2011	F		Dry channel; 1 willow, 2 cottonwoods, few deergrass.
	Oak Creek Mesa-Holding	Coon Creek- by Coon Spring	4/19/2011	B3	Stable	High diversity of vegetation, sycamore, alder, cottonwood, deergrass, etc. but low cover, lots of downed wood.
	Oak Creek Mesa-Holding	Coon Creek- by Coon Spring	10/9/2002	F3/6	Unstable	Downcut, eroding; little herbaceous, no regeneration, old sycamore and alder.
	Oak Creek Mesa	Warm Creek-upstream from FR189	4/19/2011	B/F		Spring development by road; baccharis, juncus, one tamarisk.
	Oak Creek Mesa	Coon Creek-above Coon Spring	10/9/2002	A1/2	Stable	Narrow and steep; few sycamore, alder; boulder, cobble.
	Oak Creek Mesa	Coon Creek Trib-Zimmerman Spring	4/19/2011	B/F		Small channel full of deergrass; occasional sycamore, cottonwood.
	Oak Creek Mesa	Coon Creek Trib-Zimmerman Spring	10/9/2002	F3	Impaired	Lots of deergrass; sycamore, oak, occasional cottonwood.
	Oak Creek Mesa	Coon Creek Trib-below Zimmerman Spring	10/9/2002	A3	Stable	Vegetation continues below spring; probably inaccessible.
	Oak Creek Mesa	Oak Creek trib-at unnamed spring	4/19/2011	B		Fenced; thick vegetation, deergrass, oak, juniper, willow, seep willow.
	Oak Creek Mesa	Oak Creek-at Oak Creek Spring	10/9/2002	B2	Stable	Thick herbaceous by spring; dry downstream.

Appendix B: Riparian Tables and Supporting Information

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Oak Creek Mesa	Knoles Hole Spring	10/21/2011			Abundant water and riparian vegetation in the form of emergents; high wildlife use.
	Upper Coon Creek	Coon Creek-from pvt to Coon Creek Spring	2/15/2011	F/B	Unstable	Downcut; sycamore, alder, few willow; little herbaceous.
	Upper Coon Creek	Coon Creek-from pvt to Coon Creek Spring	6/19/2000			Few palatable species; high use and trampling.
	Upper Coon Creek	Coon Creek-from pvt to Coon Creek Spring	7/8/1998			No palatable species to monitor; all sycamore seedlings browsed.
	Upper Coon Creek	Coon Creek-from pvt to Coon Creek Spring	7/7/1993	D3	Unstable	Multiple channels.
	Upper Coon Creek	Coon Creek Trib-Bill Lee Spring	2/15/2011	B		Small channel; seep willow, rabbit's foot grass, old sycamore, two willows, no regeneration.
	Upper Coon Creek	Cherry Creek-above pvt	8/11/1992	D		Braided.
Poison Springs/ Sierra Ancha	Blevens	Blevens Wash-by Lower Blevens Spring	2/28/2011			Thick vegetation at springs; deergrass, sedges, rabbits foot grass, sycamore, cottonwood.
	Blevens	Pinto Creek-upstream from Pinto Creek Well	4/27/2011	D/F	Unstable	Very wide valley; young trees, ash, cottonwood, seep willow, tamarisk.
	no grazing	Salt River-SR288 to Braddock Creek	7/14/1999			Mostly tamarisk; no use.
		Salt River-east 1 mile from Schoolhouse	9/23/1999			No use found.
		Salt River-Coon Creek to Dry Creek	7/21/1999			Thick tamarisk; cow sign but no use; cottonwood at Coon Creek.

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
Chrysotile	72	Phillips Canyon-above FR473	7/25/2003	F3	Unstable	Downcut, eroding; very few deergrass, few large sycamore and cottonwood.
	Ash Creek Riparian	Ash Creek-below FR303B	6/27/2006			Light use; deergrass, ash, Goodding's willow, and cottonwood.
	Boundary	Butte Creek-upstream of FR303A	8/7/2003			Mostly burro brush; spots of deergrass, rabbits foot grass and seep willow.
	Carol	Sycamore Creek Trib-below Borrowpit Tank	10/27/1998			Few palatable plants; no use.
	Carol	Tanks Canyon Trib-Carol Spring	4/12/2011	E	Stable	Springs create a wetland on hillside; sedges, rushes; no use.
	Gleason Riparian	Salt River-north end of pasture	7/15/2003			Cattle sign; mainly tamarisk and seep willow; few young cottonwoods.
	Home	Hess Canyon-below FR916	7/25/2003			Dominated by oak, juniper and walnut.
	Home	Hess Canyon-below FR916	6/9/1993	B5		Scoured and eroded.
	Home	Hess Canyon Trib-Rock Spring	7/25/2003	B	Unstable	Wide, dry channel; few large trees.
	Jackson	Rock Springs-below FR2327	7/25/2003	F4	Unstable	Wide, dry, eroding.
	Jackson	Rock Springs-above FR2327	4/12/2011	B	Severely Impaired	Large cottonwoods, sapling size willows, and a couple sycamores; No regeneration; no use.

Appendix B: Riparian Tables and Supporting Information

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Jackson	Rock Springs-above FR2327	7/25/2003			Dense yellow sweet clover; some seedling/sapling Goodding's willows and Fremont cottonwoods
	Jackson	Rock Springs-above FR2327	9/11/1998			Little use; mainly sycamore, walnut, seep willow, no regeneration.
	Poverty	Sevenmile Wash Trib-Poverty Spring	4/12/2011	G	Unstable	Recently downcut; seep willow dominates; scattered pole size sycamore and cottonwoods.
	Poverty	Sevenmile Wash Trib-Poverty Spring	7/25/2003			Scattered large sycamores and cottonwoods; few deergrass.
	Poverty	Sevenmile Wash Trib-Poverty Spring-by FS boundary	10/27/1998	D		Braided; no riparian vegetation.
	4 th of July Holding	Walnut Canyon-4th of July Spring	3/19/2003	F6b	Impaired	Increase in deergrass since last visit.
	4 th of July Holding	Walnut Canyon-4th of July Spring	7/16/1997	F5b	Impaired	Bedrock controlled.
	Regal	Regal Canyon-below pvt	4/20/1998	A1&2	Stable	Inaccessible; no use; baccharis.
	Timber	Ash Creek-by Timber Camp	4/12/2011	F		Eroding banks; few seedlings; low potential.
	Timber	Ash Creek-by Timber Camp	4/11/2000			Little riparian vegetation; upland plants near channel heavily browsed.
	Timber	Ash Creek-by Timber Camp	7/27/1998			Light to moderate use.
	Tony	Ash Creek-below Buck Place	5/10/2001	B3	Impaired	Ungrazed for 2 years; few deergrass.

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Tony	Ash Creek-below Buck Place	6/8/1993	F2		Large flood last winter; salt on creek.
	Tony	Ash Creek-Buck Place	4/12/2011	C	Impaired	Pole and seedling alder and box elder.
	Tony	Ash Creek-Buck Place	9/30/2004	C3	Impaired	Some recovery of vegetation and banks.
	Tony	Ash Creek-Buck Place	9/18/2002	C3	Slightly Impaired	No herbaceous; large trees.
	Tony	Ash Creek-Buck Place	6/7/2000			Recreation evident; moderate use.
	Tony	Ash Creek-Buck Place	10/21/1997	B3/G	Unstable	Depauperate; all seedlings browsed.
	Tony	Ash Creek-Buck Place	7/29/1997			Large trees; all seedlings browsed; no herbaceous.
	Tony	Ash Creek-above Buck Place	8/12/2004	B	Stable	Bedrock channel; reference reach for vegetation; inaccessible.
	Tony	Ash Creek-above Buck Place	10/21/1997	B1	Stable	
	Tony	Ash Creek-above Buck Place	7/29/1997			Very diverse vegetation.
Haystack Butte	Upper Ash Creek	Butte Creek Trib-by FR1067	3/31/2000	A1	Stable	No riparian vegetation.
	Ash Creek	Ash Creek-by FR3127	5/12/2006			Light use; diverse species.
	Ash Creek	Ash Creek-by FR3127	2/1/2005			Cattle not in pasture; light use from stray horse.
	Ash Creek	Ash Creek-by FR3127	2/5/2003			Light use; diverse age classes.
	Ash Creek	Ash Creek-by FR3127	2/21/2002			Light use; diverse age classes and species.

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Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Ash Creek	Ash Creek-by FR3127	11/16/2000			Light to moderate use; diverse age classes of trees.
	Bronson	Butte Creek-above Sanders Spring	7/30/2003	F	Unstable	No riparian vegetation; road impacts.
	Bronson	Bronson Canyon-above Bronson Spring	8/10/2011	F	Impaired	All ages red ns Goodding's willow, sycamore, cottonwood; no bank features; no recent use.
	Bronson	Bronson Canyon-above Bronson Spring	8/21/2002			High use on woody species.
	Bronson	Bronson Canyon-above Benson Spring	11/20/2001			High use on woody species and deergrass.
	East Steer	Bronson Canyon-below Bronson Spring	2/13/2006			Light use on deergrass, no use on woody species.
	East Steer	Bronson Canyon-below Bronson Spring	8/15/2005			Light use.
	East Steer	Bronson Canyon-below Bronson Spring	9/24/2004			Use uncertain due to regrowth.
	East Steer	Bronson Canyon-below Bronson Spring	6/14/2002			High use on woody species and deergrass.
Hicks/Pikes Peak	Hicks	Hicks Wash- from SR 288 upstream to spring	6/26/2001	F		Hackberry and desert willow.
	Holly	Blevens Wash (Bluff Spring)	12/20/2006			Dense patch of deergrass with few cottonwoods and Goodding's willow.
	Horseshoe Bend	Sycamore Canyon Trib-Sycamore Well	6/26/2001	F4		Braided; sycamore, walnut, willow.

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Horseshoe Bend	Mud Springs Wash-upstream of pasture boundary	2/2/2012	F	Unstable	Channel used as a travel way; no herbaceous; 100 percent use on seep willow; ATV tracks.
	Horseshoe Bend	Mud Springs Wash-upstream of pasture boundary	2/2/2012	F	Unstable	Channel used as a travel way; no herbaceous; 100 percent use on seep willow; spring is perennial.
	Horseshoe Bend	Mud Springs Wash-upstream of pasture boundary	3/18/2008		Unstable	Baccharis species; ATV and cattle impacts.
	Horseshoe Bend	Sycamore Canyon-above spring	2/2/2012	F	Unstable	No herbaceous, deergrass extirpated; heavy trailing; spotty sycamore, cottonwood, willow.
	Horseshoe Bend	Sycamore Canyon-above spring	3/18/2008	F		Road on floodplain; seep willow, willows, some deergrass; highly trampled
	Horseshoe Bend	Sycamore Canyon-above spring	7/21/1992	F4		Stock impacts severe.
	Horseshoe Bend	Sycamore Canyon-below spring	2/2/2012	F	Unstable	No herbaceous, deergrass extirpated; heavy trailing; spotty sycamore, cottonwood, willow.
	Horseshoe Bend	Sycamore Canyon-below spring	6/26/2001	C		Sycamore, cottonwood, willow, deer grass, baccharis; no use.
	Horseshoe Bend	Sycamore Canyon-below spring	12/29/2000			Use was low but measurable vegetation was sparse.
	Horseshoe Bend	Sycamore Canyon-below spring	8/25/1998			All ages of cottonwood, willow, sycamore; trace deergrass.

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Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Kenny	DeVore Wash-below Murphy Spring	4/16/2009	F		Significant riparian area; highly trampled.
	Kenny	DeVore Wash-below Murphy Spring	4/9/2007			Cottonwood and willow dominate; sedges and rushes; no deergrass.
	Kenny	DeVore Wash-below Murphy Spring	12/20/2006	B	Impaired	Seep willow and sedges; trace deergrass.
	Kenny	DeVore Wash-below Murphy Spring	12/1/2004	F4/5		Sycamore, willow, cottonwood and seep willow.
	Kenny	DeVore Wash-below Murphy Spring	1/8/2004			Couple deergrass, <30 percent use; no recruitment.
	Kenny	Devore Wash-dry reach	4/16/2009	F		Dryer; spotty riparian vegetation.
	Kenny	DeVore Wash-narrow reach	4/16/2009	C/F		Use on deergrass and banks light but increased upstream to heavy.
	Kenny	DeVore Wash-narrow reach	6/26/2001	F/Bc		Old sycamore and cottonwood; little regeneration.
	Kenny	DeVore Wash-narrow reach	7/1/1992	F5		Primarily baccharis.
	Kenny	DeVore Trib-south of Indian Spring	6/26/2001	A2		Steep and narrow; deergrass, cottonwood, willow.
	Lower Shute Springs	Pinal Creek-from Inspiration Dam to Salt River	6/28/2011			No cattle access; thick vegetation and much bedrock.
	North Steer	Pinal Creek-upstream from Inspiration Dam	9/26/2001	B4c	Impaired	Fenced in 2000; tamarisk, willow, sedges and rushes.
	Ortega	Mud Springs Wash-below Turnout Spring	2/2/2012	F		One cottonwood, some grasses; little potential.

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Ortega	Mud Springs Wash-below Turnout Spring	6/26/2001	F4		Not used since 1999; lots of seep willow; cottonwood regeneration.
	Ortega	Mud Springs Wash-downstream of pasture boundary	2/2/2012	F		Spring in bedrock above a waterfall supporting grasses; difficult cattle access.
	Ortega	Storm Canyon-by Grapevine Spring	4/13/2011	F		Tamarisk in canyon; few willows and seep willow near spring.
	Rip	Hicks Wash-at Rockhouse Trough	4/26/2010	F		Last big old cottonwood fallen over; some seedlings; no use.
	Rip	Hicks Wash-at Rockhouse Trough	12/1/2004			Some big old cottonwoods; no regeneration.
	Rip	Hicks Wash-at Rockhouse Trough	6/26/2001	F5		Some big old cottonwoods.
	Rip	Hicks Wash-below Rip Spring	4/26/2010	F	Severely Impaired	Spotty cottonwoods and seep willow up wash to spring; large patch of coyote willow near spring; lots of trailing; low use on vegetation.
	West	DeVore Wash-south of SR 188	6/26/2001	F4		Old cottonwood and sycamore; downcut; wetter upstream with cottonwood and willow.
Sedow	4Y	Yankee Joe Canyon-by Lower Yankee Joe Spring	3/6/2002			Low recruitment, not enough woody vegetation to monitor; use on deergrass was low; high bank alteration.
	4Y	Yankee Joe Canyon-by Lower Yankee Joe Spring	2/7/2002			Medium trees only, not enough woody vegetation to monitor; heavy trailing.

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Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Big Horse	Hess Canyon-above Adobe Ranch	8/25/2011	F	Unstable	High use on unpalatable species and coyote willow.
	Big Horse	Hess Canyon-above Adobe Ranch	11/20/2000			Use on the few woody plants was moderate; no deergrass.
	Big Horse	Hess Canyon-above Adobe Ranch	5/8/1998	F4	Unstable	100 percent use on vegetation and banks.
	Bronson	Nesbitt Spring-up and downstream from FR303	6/22/2011	B	Impaired	Banks present; deergrass consistent along channel, use moderate; cottonwood, Goodding's willow, sycamore consistent but sparse, no regeneration; heavy trailing.
	Bronson	Nesbitt Spring-up and downstream from FR303	12/12/2006			High density of deergrass, low use; trace of palatable woody, low use; cottonwood, Goodding's willow, coyote willow; moderate trailing.
	Bronson	Nesbitt Spring-up and downstream from FR303	3/28/2002			Moderate use on deergrass; sparse Goodding's willow, trace seedlings; heavy trailing.
	Bronson	Nesbitt Spring-up and downstream from FR303	11/29/2001	B4	Impaired	Narrow valley; thick deergrass, moderate to high use; woody species include cottonwood, Goodding's and coyote willow; heavy trailing.
	Bronson	Nesbitt Spring-inaccessible spots	8/12/1998	A3	Stable	Thick deergrass; bedrock.

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Bronson	Nesbitt Spring-by confluence	6/22/2011	B/F	Impaired	High density seep willow; deergrass lines channel, moderate use; sparse cottonwoods; some regeneration of sycamore and Goodding's willow; heavy trailing.
	Bronson	Nesbitt Spring-by confluence	3/28/2002			High use on woody vegetation, low use on deergrass; heavy trailing.
	Bronson	Bronson Canyon-downstream from Nesbitt Spring	6/22/2011	C	Impaired	Deergrass lines channel; seep willow dominates; patches of coyote willow; few sycamore; little regeneration; moderate trailing.
	Bronson	Bronson Canyon-downstream from Nesbitt Spring	3/28/2002			Moderate use on woody vegetation, low use on deergrass.
	Bronson	Bronson Canyon-downstream from Nesbitt Spring	11/29/2001			High use on woody vegetation, moderate use on deergrass.
	Brushy	Sedal Canyon-by FR 645	7/28/1993	C		ATV tracks along channel.
	Brushy	Sedal Canyon-downstream from Brushy Spring	8/25/2011	F	Unstable	No channel features; channel used as travel way; sparse cottonwoods and willows line channel.
	Brushy	Sedal Canyon-downstream from Brushy Spring	7/30/2003	B1/4		
	Brushy	Sedal Canyon-downstream from Brushy Spring	8/12/1998	G1	Impaired	Downcut to bedrock; no cattle impacts.

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Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Brushy Trap	Brushy Spring	8/25/2011	F	Unstable	Narrow valley bottom, no channel features; drinker on bank; patches of coyote willow; wet area covered with willow seedlings and sedges
	Little Walnut Trap	Little Walnut Spring	10/4/2011	B/A	Stable	Channel steep and rocky; cottonwood, willow, walnut, grape, thick equisetum.
	Little Walnut Trap	Little Walnut Spring	10/4/2011	F	Unstable	Short reach near drinker heavily used.
	Hess	Hess Canyon-below Adobe Ranch	9/18/2000	B & F	Unstable	
	Hess	Hess Canyon-below Adobe Ranch	9/2/1993	B4		Little herbaceous, heavily grazed; channel scoured in winter floods.
	Hess	Hess Canyon-upstream from FR303	8/25/2011	F	Unstable	Heavy trailing; high use on coyote willow and false indigo; sparse deergrass, sycamore, cottonwood.
	Hess	Hess Canyon-upstream from FR303	5/5/2003			Cottonwood, Goodding's willow saplings; sparse deergrass.
	Hess	Hess Canyon-upstream from FR303	5/8/1998	B4c	Impaired	Established cross section; high diversity of riparian vegetation; high use on willows.
	Hess	Hess Canyon-upstream from FR303	7/8/1992			No bank features.
	Hess	Hess Canyon-downstream from FR303	8/20/2004	F5b	Impaired	Established cross section.
	Hess	No Name Spring-below enclosure	4/20/1999	F		High bank trampling; use on seep willow and deergrass.

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Hess	No Name Spring-in enclosure	4/20/1999			Thick deergrass covers wide channel.
	Hess	Pancho Spring	8/25/2011	F	Impaired	Drinker in channel; high impacts around drinker, less upstream; moderate use on thick deergrass; cottonwood, sycamore, willow.
	Hudson	Hudson Spring	8/25/2011	F/C	Impaired	Narrow valley bottom; thick willow and seep willow.
	Hudson	Hudson Spring	5/8/1998			Streambanks and woody species 100 percent use; cattle in riparian area.
	Hudson	Little Woodcamp Creek-upstream from pasture boundary	5/5/1998			Similar to Hudson Spring; has better bank features.
	Indian Garden	Garden Spring	5/16/2002			Heavy trampling; not enough vegetation to use monitoring protocol; few willow seedlings showed moderate use.
	Monument Trap	Monument Spring-below enclosure	6/22/2011	F	Unstable	Pole size cottonwoods, willows; spring area trampled; fresh cattle sign; channel used as travel way; no herbaceous; no regeneration.
	Monument Trap	Monument Spring-in enclosure	6/22/2011	F5	Impaired	Sapling and pole cottonwood and Goodding's willow; deergrass and sedges; no use.
	Monument Trap	Monument Spring-in enclosure	5/2/2001	F6	Unstable	Whole channel is boggy; no deergrass; available cottonwoods and willows used.
	New Corral	New Corral Spring	6/22/2011			

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Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	New Corral	New Corral Spring	9/18/2000	F4	Unstable	Lots of deergrass, high use.
	New Corral	Hess Canyon Trib-downstream from FR1013	9/25/2001	F		Sapling size cottonwood, willow, sycamore; heavy trailing; no bank features; some deergrass.
	Rock Springs Riparian	Rock Springs-in enclosure	2/22/2012	A	Stable	Not accessible; sycamore, cottonwood, seep willow.
	Rock Springs Riparian	Rock Springs-in enclosure	8/15/2001			Cottonwood, sycamore, Goodding's willow, arroyo willow, coyote willow, false indigo, seep willow.
	Sevenmile Riparian	Sevenmile Wash-in enclosure	2/22/2012	F	Unstable	Wide, sandy; pole size willows falling over; no herbaceous or woody regeneration.
	Sevenmile Riparian	Sevenmile Wash-in enclosure	3/18/2003	C5	Stable	Established cross section.
	Sevenmile Riparian	Sevenmile Wash-in enclosure	8/15/2001			Dense sapling cottonwoods and willows.
	Sevenmile Riparian	Sevenmile Wash-in enclosure	4/20/1999	F w/ C		Cow sign; bank trampling; seedling/sapling willows.
	Sevenmile Riparian	Sevenmile Wash-in enclosure	6/24/1992	F5		Damage to trees and shrubs by cows.
	Steer	Hess Canyon-by Willow Spring	10/4/2011	F	Unstable	Spotty old sycamore and cottonwood; deergrass extirpated; spring enclosure intact; high old use on false indigo.
	Steer	Hess Canyon-by Willow Spring	7/10/2006			Mostly mature cottonwood and sycamore; willow species near spring; spring fenced.

Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Storm Canyon	Blackjack Wash-upstream of FR368	4/23/2001	F		Two large cottonwoods, no other riparian vegetation.
	Storm Canyon	Yankee Joe Canyon-upstream from first FR645 crossing	5/5/2003			Deergrass had low vigor, use from 2001 still evident; mortality of false indigo and willows
	Storm Canyon	Yankee Joe Canyon-upstream from first FR645 crossing	5/2/2001	C5	Impaired	High bank impacts; deergrass lining channel, some use.
	Storm Canyon	Yankee Joe Canyon-upstream from first FR645 crossing	4/20/1999	C5	Impaired	Mature cottonwood, no regeneration; high bank alteration and use on deergrass.
	Storm Canyon	Yankee Joe Canyon-downstream from Yankee Joe Spring	10/4/2011	B	Impaired	Pole size cottonwood and willow; thick desert baccharis and patches of false indigo; small defined channel of sand.
	Storm Canyon	Yankee Joe Canyon-downstream from Yankee Joe Spring	4/19/2001	B	Impaired	No deergrass; little regeneration; high bank impacts.
	Storm Canyon	Yankee Joe Canyon-by Walnut Spring	10/4/2011	Bc		Channel is bare sand with mostly tamarisk; some willow, walnut, cottonwood.
	Storm Canyon	Yankee Joe Canyon-by Walnut Spring	4/23/2001			No use on woody vegetation, moderate use on deergrass, high bank alteration.
	Storm Canyon	Storm Canyon-along FR2321	10/4/2011	B	Impaired	Occasional pole cottonwood; no herbaceous, no woody regeneration; thick desert baccharis.

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Allotment	Pasture	Stream Name	Date	Stream Type	Condition	Notes
	Storm Canyon	Walnut Spring	10/4/2011	F	Unstable	No channel features; Goodding's willows have a shrubby appearance.

Riparian Tables A4: Water sources and inventory data for the project area*Dagger Allotment***Table 23: Water sources and inventory data for Dagger Allotment**

State File Number	Use Name	Date	Remarks
33-87770	Rock Spring		
33-87771	Granite Basin Spring	9/29/2011	Not functioning; deergrass.
33-87774	Jump Off Spring		
36-103071	Zimmerman Spring	4/19/2011	Deergrass.
36-103072	Warm Spring		
36-24179	Tewksbury Spring		
36-24180	Weinel Spring		
36-24244	Edwards Spring	10/28/2011	Wet meadow.
36-24245	Coon Spring	4/19/2011	Functioning; no riparian vegetation
36-24246	Cold Spring	10/28/2011	Runs into Cold Spring Canyon.
36-24247	Mud Spring	10/21/2011	Access is very difficult.
36-24251	Trailside Spring	10/21/2011	Willow, rudbeckia, emergents; water source is small.
36-24252	Hunt Spring	10/21/2011	Area is dry but shows evidence of past emergent vegetation and use by wildlife.
36-24344	Bladder Spring		
36-24347	Unnamed Spring	2/15/2011	Mature sycamore and few willows; fish in creek.
38-25167	Montague Tank		
38-25168	Winter Pasture Tank		
38-25169	White Ridge Tank		
38-25170	Unnamed Tank	8/30/2009	Functioning.
38-25171	Sheep Wash Tank		
38-25172	Natural Corral Tank	8/29/2009	Functioning.
38-25173	Hefner Tank		
38-25174	Granite Tank		
38-25248	Oak Creek Tank		
38-25249	Upper Cougar Tank		
38-25251	Unnamed Tank		
38-25252	Lower Grantham Tank		
38-25253	Shack Tank		
38-25254	Little Flat Tank		
38-25255	Rutherford Tank		

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State File Number	Use Name	Date	Remarks
38-25256	Never Go Dry Tank		
38-25257	Ridge Tank		
38-25259	Asbestos Ridge Tank		
38-25260	Deep Creek Tank		
38-25261	Center Mountain Tank		
38-25264	Upper Grantham Tank		
38-25265	Mesa Tank		
38-25266	Bull Canyon Tank		
38-25267	Unnamed Tank		
38-89017	28 Tank		
4A-2117	Tin House Spring	4/19/2011	Not functioning; herbaceous vegetation.
4A-2895	Oak Creek Spring	4/19/2011	Spring is fenced.
4A-3466	Bill Lee Spring	2/15/2011	Mostly sycamore, 2 willows, shrubs and an area of grass near the confluence, seep willow, rabbit's foot grass.
4A-3467	Coon Creek Spring	2/15/2011	Functioning; deergrass, mature sycamore, willow, alder.
4A-3468	Dagger Spring	10/1/2009	Not functioning.
4A-3469	Devore Spring		
4A-3470	Dripping Spring		
4A-3471	Liquor Spring	10/1/2009	Not functioning; willow & seep willow.
4A-3472	Montag Spring	5/27/2010	Large deergrass and seep willow.
55-507908	Upper Sheep Well		
55-507909	Devore Well	8/30/2009	Not functioning.
55-600991	Banning Windmill		
55-600992	Cherry Creek Well		
55-600993	Sheep Wash Well		
55-600994	Pringle Wash Well		
55-600995	Montague Well	8/30/2009	Not functioning.
55-601004	Natural Well	8/29/2009	Functioning but unused.
55-601056	Bladder Windmill		
55-601067	Zimmerman Well		

Poison Springs Allotment

Table 24: Water sources and inventory data for Poison Springs Allotment

State File Number	Use Name	Date	Remarks
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Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
36-103070	Summit Spring	6/26/2007	Not functioning; spotty riparian vegetation.
36-24195	Poison Spring		
36-24338	Hackberry Spring		
36-24339	High Blevens Spring		
36-24348	Black Mesa Spring		
36-24349	Lower Blevens Spring	6/26/2007	Not functioning; thick riparian vegetation.
38-25117	Chalk Tank		
38-25118	Blevens Tank	6/28/2007	Could not locate.
38-25119	Black Mesa Tank #1		
38-25120	Black Mesa Tank #2		
38-25121	Black Mesa Tank #3		
38-25122	Barley Patch Tank	7/18/2007	Could not locate.
38-25123	Unnamed Tank		
38-25124	Salt Peak Tank	6/29/2007	Could not locate.
38-25125	Burnt Canyon Tank		
38-25126	Canal Stock Tank		
38-25127	Unnamed Tank	7/19/2007	Functioning.
38-25128	Tucker Tank	7/19/2007	Could not locate.
38-25129	Road Junction Tank	7/10/2007	Functioning.
38-25130	Pinto Mesa Tank	7/10/2007	Functioning.
38-25131	No Salt Tank		
38-25132	Haven Trail Tank	6/5/2007	Functioning.
38-25133	Hackberry Mountains Tank		
38-25134	Ground Tank	6/29/2007	Could not locate.
38-25135	Three C Tank		
38-25136	Upper Dry Tank		
38-25247	Spring Creek Flat Tank		
38-25250	Cholla Ridge Tank	5/11/2011	Functioning.
38-25258	Colcord Tank		
38-25262	Roadrunner Tank		
38-25263	Byrns Tank		
38-87758	West Canal Tank		
55-507712	Unnamed Well		

Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
55-600963	Cottonwood Horz Well		
55-600964	Chalk Creek Horz Well	1/30/2009	Not functioning.
55-600965	Jose Well		
55-601027	Pinto Creek Well	4/27/2011	Functioning.
55-601028	Blevins Wash Well	6/7/2007	Not functioning.
55-601033	Poison Spring Windmill	7/19/2007	Could not locate.
55-601034	Poison Spring Horz Well		
55-601035	Summit Well	7/19/2007	Not functioning.
55-601036	Meddler Wash Horz Well		
55-601037	Willow Ridge Well		
55-601038	Meddler Wash Windmill		
55-601039	Hackberry Wash Well		
55-601040	Jackson Well		
55-601058	Dry Creek Windmill		
55-601060	Bruce Horz Well	4/27/2011	Could not locate well; drinkers dry.

Chrysotile Allotment

Table 25: Water sources and inventory data for Chrysotile Allotment

State File Number	Use Name	Date	Remarks
33-90194	Tony Spring	11/5/2006	Riparian vegetation present.
33-90195	Upper Bear Spring		
33-90197	Hackberry Spring		
33-90198	Woodpecker Spring		
33-90199	Pick Spring		
33-90200	Crow Spring		
33-90201	Bedrock Spring		
33-90202	Marano Spring		
33-90203	Cottonwood Spring		
33-90204	John Spring		
33-90205	Jim Spring		
33-90206	Remoan Spring		
33-90207	Ray Spring		
33-90208	Walnut Spring		
33-90209	Bee Spring	1/9/2007	Spring supports riparian vegetation along the channel.

Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
33-90210	Lower Sevenmile Spring		
33-90211	Butte Spring		
33-90212	Picacho Spring		
33-90213	Trail Spring	2/7/2005	Functioning.
33-90305	Canadian Spring		
36-18857	Sevenmile Spring		
36-18858	Phillips Spring	1/29/2007	Bermuda grass.
36-18859	Mormon Spring	2/5/2007	Not functioning.
36-18860	Lower 4 th of July Spring		
36-18861	Unnamed Spring		
36-18862	Quail Spring		
36-18863	Bear Canyon Spring		
36-18864	Poverty Spring	4/12/2011	New development.
36-23992.2	Trail Stockpond		
36-23992.3	Canadian Stockpond		
36-23992.4	Seneca Stockpond		
36-23992.5	Cibecue Stockpond	11/5/2006	Functioning.
36-23992.6	Juniper Stockpond		
36-23992.7	Blue Stockpond		
36-23992.8	Black Stockpond	1/2/2007	Functioning.
36-23995.5	Gleason Stockpond		
36-23995.6	Rim Stockpond		
36-23995.7	Trail Stockpond		
36-25329	Bassett Spring	1/3/2007	Spring emerges in a wash.
36-71952	Buck Place Spring		
38-19054	Toney Tank	11/5/2006	Not functioning.
38-19055	Toney Tank #2		
38-19056	Reservation Line Tank		
38-19057	Hicks Tank	11/4/2004	Functioning.
38-19064	Carol Tank #2	10/22/2006	Functioning.
38-19065	Carol Tank	4/12/2011	Functioning; fenced in a water lot.
38-19066	Highway Tank	10/27/2006	Functioning.
38-19067	Ash Tank		
38-19068	Reservation Tank	12/27/2006	Functioning.
38-19069	White Tank	11/3/2006	Functioning.
38-19071	Turkey Tank	1/9/2007	Functioning.

Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
38-19072	Pine Tree Tank	10/29/2006	Functioning.
38-19073	Carol Tank #1	4/12/2011	Functioning.
38-19074	Pine Tank	4/28/2003	Functioning.
38-19075	Pigeon Tank		
38-19076	Ripley Canyon Tank		
38-19077	Jackson Tank	1/3/2007	Functioning.
38-19078	Timber Camp Tank	2/11/2007	Functioning.
38-19079	72 Tank	12/15/2006	Functioning.
38-19080	Ash Spring Tank		
38-19081	Borrowpit Tank	1/9/2007	Not functioning.
38-19082	Granite Tank		
38-19083	Sevenmile Tank		
38-19091	Colorado Tank		
38-19092	Butte Tank	7/5/2009	Functioning.
38-19093	Top of the Mountain Tank	12/15/2006	Functioning.
4A-1207	Carol Spring	4/12/2011	Wetland on hillslope with sedges, rushes, orchard grass.
4A-1208	Survey Spring	11/19/2006	Functioning; cottonwood, sycamore, walnut, grapevine and blackberry.
4A-1209	Woods Spring		
55-600962	Seventy-two Well		
55-600986	Granite Well		
55-601066	Rock Spring Well	1/3/2007	Functioning.
55-645024	Timber Camp Well		

Haystack Butte Allotment

Table 26: Water sources and inventory data for Haystack Butte Allotment

State File Number	Use Name	Date	Remarks
33-87755	Rock House Spring	8/10/2011	New development; trace deergrass, cottonwood, walnut, willow.
33-87756	Hoof Print Spring		
36-103340	Barrel Spring		
36-103341	Deer Spring		
36-103342	Haystack Spring		
36-103343	Eagle Spring		

Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
36-103344	White Spring		
36-103345	Quail Spring	6/14/2009	Could not locate.
36-103434	Surprise Spring		
36-103435	Canyon Spring		
36-103436	Lion Spring		
36-103437	East Ash Creek Spring		
36-103438	Hidden Spring		
36-103476	Old Timer Spring		
36-14731	Orchard Place Spring		
36-14795	Unnamed Spring		
36-14796	White Ledges Spring		
36-14797	Willow Spring #2	7/6/2009	Trace sycamore, some deergrass.
36-14798	Yellowjacket Spring		
36-14799	Willow Spring	7/6/2009	Not functioning; densely vegetated channel; grape, willows, hackberry.
36-14800	Slickrock Spring		
36-14802	Little Butte Spring		
36-14803	Cedar Trap Spring		
36-14807	Bluff Spring		
36-14808	Bronson Spring	8/10/2011	Functioning; sycamore, cottonwood, red and Goodding's willow, all ages.
36-14809	Cottonwood Box Spring		
36-14810	Cottonwood Spring		
36-14811	Freezeout Spring	7/6/2009	Willow, mesquite, deergrass.
36-14812	Headquarters Spring	6/14/2009	Functioning; sycamore, lots of walnut.
36-14813	Hidden Spring		
36-23994.18	Three Way Stockpond		
36-23995.1	Three Way Stockpond		
36-23995.2	Haystack Stockpond		
36-23995.3	Cedar Stockpond		
36-23995.4	Picacho Stockpond		
36-25328	Sanders Camp Spring	6/14/2009	Functioning; seep willow, grapevine, deergrass.
38-14604	Steer Tank	6/19/2009	Functioning.
38-14605	Cypress Tank		
38-14606	Black Mesa Tank		

Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
38-14607	Basin Tank		
38-14623	Blackjack Tank		
55-503833	Turkey Horz Well		
55-503834	Rock Horz Well		
55-503835	Yellowjacket Horz Well		
55-503839	Saddle Horz Well		
NA03120203	Bronson TT		
NA03120204	Bronson WD Tank		

Sedow Allotment

Table 27: Water sources and inventory data for Sedow Allotment

State File Number	Use Name	Date	Remarks
33-77030	Timber Spring		
33-77050	Granite Spring		
36-103272	Double Corral Spring	5/30/2009	Functioning; area fenced; willow, cottonwood, tamarisk.
36-103273	Cavey Spring		
36-23994.10	Steer Tank		
36-23994.11	Timber Tank	2/18/2007	Functioning.
36-23994.12	Yankee Tank		
36-23994.8	J U Tank		
36-23994.9	Bronson Tank		
36-24004	J U Spring	6/22/2011	Functioning; cottonwoods and willows.
36-24005	Yankee Joe Spring	5/31/2009	Small emergence; little riparian vegetation.
36-24008	Sedow Canyon Seep #2		
36-24009	Sedow Canyon Seep #1		
36-24010	Pancho Spring	8/25/2011	Functioning; thick deergrass, willow.
36-24011	New Corral Spring	6/22/2011	Functioning; couple cottonwoods.
36-24012	Nesbitt Spring		
36-24013	Monument Spring	5/31/2009	Functioning; in trap with significant riparian vegetation.
36-24014	Lower Yankee Joe Spring		
36-24015	Little Pipe Spring		

Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
36-24016	Hudson Spring	8/25/2011	Functioning; sedges; riparian vegetation upstream.
36-24017	Division Spring	6/13/2009	Not functioning; cottonwoods, sedges.
36-24018	Clay Spring		
36-24021	Brushy Spring	8/25/2011	Functioning; in trap with significant riparian vegetation.
36-24022	Blackie Spring		
36-24023	Yankee Joe Seep		
36-24024	Willow Spring		
36-24025	Walnut Spring	10/4/2011	Functioning; in trap with willows.
36-24026	Storm Canyon Spring	10/4/2011	Few pole cottonwoods, desert baccharis, false indigo.
36-24027	Upper Yankee Joe Spring	6/27/2009	Cottonwood, false indigo.
36-25332	Adobe Spring Well		
38-23912	Indian Gardens Tank		
38-23913	Rock Tank	6/22/2009	Functioning.
38-23958	Blackjack Tank		
38-23959	Jackson Butte Tank		
4A-1211	Rock Springs	6/22/2009	Not functioning; cottonwood, sycamore, grape, some cattail, sedges.
4A-2378	X Four Spring	5/30/2009	Functioning.
4A-2380	Garden Spring	6/26/2009	Functioning; willow dominant.
55-600961	Little Walnut Well	5/30/2009	Functioning; willows, cottonwoods.
55-600978	East X Four Well	5/30/2009	Functioning.
55-600979	Little Pipe Horz Well		
55-600980	Cavey Horz Well		
55-600987	Cottonwood Horz Well		
55-601061	Bushy Horz Well		
55-601062	Adobe Horz Well		
55-601063	No Name Horz Well	6/29/2009	No sign of well; lush riparian area.
55-601064	Steer Pasture Well		
55-601065	Bear Cub Horz Well	6/15/2009	Could not locate; channel contained seep willow, willow, sycamore.
55-601967	Carney Horz Well		
55-645022	5 Mile Well	9/7/2008	Could not locate.
55-645023	6 Mile Well	9/7/2008	Could not locate.
NA03120202	Blackie TT	6/13/2009	Not functioning.

Hicks-Pikes Peak

Table 28: Water sources and inventory data for Hicks-Pikes Peak Allotment

State File Number	Use Name	Date	Remarks
33-94336	Hicks Spring		
33-94719	Rip Spring	3/16/2005	Functioning; willow, cottonwood.
33-94720	Pinyon Spring		
33-94723	Hope Spring		
33-94834	Moonshine Spring	3/12/2005	Not functioning.
33-94835	Trap Mesa Spring		
33-94836	Willow Spring		
36-103274	Dragger Horse Spring		
36-105425	Sycamore Spring		
36-18997	Lower Cox Canyon Spring		
36-18998	Little Brewster Spring		
36-18999	Laurel Spring	12/20/2006	Functioning; hillside spring.
36-19000	Jump Off Spring	8/10/2007	Could not locate.
36-19001	Jumpoff Water Spring	8/6/2007	Could not locate.
36-19002	Indian Spring	11/7/2005	Functioning; cottonwood, Goodding's willow, ash, seep willow.
36-19003	Horse Spring		
36-19004	Grapevine Spring	4/27/2009	Willows, seep willow, cottonwood, hackberry.
36-19005	Granite Spring		
36-19007	Cold Water Spring	2/20/2010	Functioning; seep willow.
36-19007	Cold Water Spring	8/8/2007	Could not locate.
36-19008	Brush Spring		
36-19009	Bluff Spring	12/20/2006	Not functioning; continuous deer grass, some seep willow and sedges.
36-24028	Procopio Spring	6/22/2007	Needs repair.
36-24029	Rockhouse Trial Spring	3/12/2005	Not functioning; cottonwood.
36-24030	Thirty Nine Spring	7/9/2007	Could not locate.
36-24031	Trap Mesa Spring		
36-24032	Turnout Spring	4/27/2009	Willow, seep willow, mesquite, netleaf hackberry present in sandy wash.
36-24033	Willow Spring		
36-24034	Wood Spring	8/27/2007	Not functioning; mesquite, no riparian vegetation.
36-24035	Cement Spring		

Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
36-24036	Granite Spring		
36-24037	Price Spring	8/7/2007	Could not locate.
36-24038	Upper Cox Canyon Spring		
36-25341	Lower Mud Spring	6/14/2007	Functioning.
36-25342	Moonshine Spring	3/12/2005	Not functioning.
36-25343	Murphy Spring	12/20/2006	Functioning; sedges seep willow, deer grass, mature cottonwood, walnut, ash, sycamore.
36-25344	Mexican Camp Spring	11/8/2005	Functioning; lots of deer grass, walnut, ash, Goodding's willow, cottonwood.
38-23828	Horse Spring Tank		
38-23829	Roy's Tank	5/21/2007	Functioning.
38-23830	Summit Tank	5/11/2007	Not functioning.
38-23831	Apache Tank #2	8/16/2007	Functioning.
38-23832	Shute Tank	2/2/2009	Functioning.
38-23833	Redmond Tank	2/20/2010	Functioning.
38-23834	Apache Tank	8/16/2007	Functioning.
38-23835	Big Pond Tank	5/21/2007	Functioning.
38-23836	Rip Spring Tank	4/26/2010	Functioning.
38-23849	Murray Tank		
38-23923	Rocky Tank	6/14/2007	Functioning.
38-25143	Rockinstraw Tank #2		
38-25144	Rockinstraw Tank		
38-25145	Big Boulder Tank	1/31/2009	Functioning.
38-25146	Kyles Tank	2/6/2009	Functioning.
38-25147	Shute Tank #2	2/2/2009	Functioning.
38-25148	Jackson Tank	5/21/2007	Functioning.
55-600950	Shute Spring Well	9/25/2003	Not functioning; fence down; walnut, willow, herbaceous.
55-600955	Redmond Well	2/20/2010	Functioning; in the wash; cottonwood, willow nearby.
55-600956	Shute Road Well	11/3/2003	Functioning; drinker has no wildlife escape ramp.
55-600957	Little Mud Well		
55-600958	Sycamore Well	5/31/2007	Windmill is inactive; sycamore, walnut, cottonwood in wash.
55-600959	New Water Well	11/22/2003	Functioning.

Appendix B: Riparian Tables and Supporting Information

State File Number	Use Name	Date	Remarks
55-600960	Storm Canyon Well		
55-601045	Big Pasture Well		
55-601049	Summit Well	11/3/2003	Functioning? drinker has no wildlife escape ramp.
55-601049	Summit Well	5/11/2007	Disconnected.
55-601050	Dago Horz Well	12/23/2004	Functioning?
55-601070	Upper Well	11/22/2003	Functioning.
55-601072	Pinal Well		
55-601073	Devore Wash Well	6/7/2007	Functioning; in the wash; thick willow.
55-601074	Scanlon Well		
55-601075	Rockhouse Well		
55-601078	Dago Well	12/23/2004	Functioning.
55-601079	Lower Well	11/22/2003	Functioning; drinker has no wildlife escape ramp.
55-601079	Lower Well	5/11/2007	Disconnected.
55-601080	Hicks Well		
55-805499	Hicks Spring Well		

Proposed troughs and wells located in or near riparian areas

Table 29: Proposed troughs and wells located in or near riparian areas by allotment, pasture, and stream name.

Allotment	Pasture	Stream Name	Comments
Dagger	Upper Coon Creek	Bill Lee Spring	trough near channel
Chrysotile	Ash Creek Riparian	Ash Creek	trough in channel
	Carol	Carol Spring	well and trough near wetland
Haystack Butte	East Steer	Bronson Canyon	well and trough in channel

Appendix C - Wildlife Tables and Conservation Measures

Site Specific Conservation Measures: Mexican Spotted Owl

- Where feasible, the Tonto NF shall avoid activities within 0.25 mile of PACs during the MSO breeding season (March 1 to August 31) that could result in disturbance to owls (USFWS 2012).
- MSO recovery plan guidelines will be used in PACs and critical habitat where grazing occurs.
- No grazing on northern portion of Oak Creek Mesa Pasture to protect MSO, MSO Critical Habitat, Chiricahua Leopard Frog, sensitive plants, and unique springs/wet meadows (see map below).
 - This part of the pasture may be used under extenuating circumstances should the need arise. Extenuating circumstances are defined as: other scheduled pastures on the allotment affected by moderate or severe drought, wildfire or utilization along Salt River has been met and other pastures cannot be used because of conflicting conservation measures for other species. Other circumstances may be defined by the district ranger.
 - Utilization of this pasture may have conservative use levels met and exceeded. This would only be allowed once and if the pasture is used in such a way it would then be rested for a minimum of five years.
 - Riparian and sensitive areas would be carefully monitored so as not to create impacts that would prohibit regrowth.

Guidelines from MSO Recovery Plan (USFWS 2011)

The following guidelines are provided for grazing management in all areas of protected and recovery habitats:

- Resource managers should conduct site-specific assessments, utilizing pertinent research information and standardized monitoring techniques to identify the appropriate vegetative conditions needed to maintain or improve:
 - Habitat conditions for availability of prey species to Mexican spotted owl,
 - Conditions of riparian and meadow habitats including their functional processes,
 - Conditions and processes required for the restoration and maintenance of historical fire regimes and native plant communities where fire has historically influenced habitat structure and plant composition. These assessments should be conducted during both dormant and growing seasons to provide favorable habitat characteristics throughout the year. Assessments should be used to design and modify livestock grazing strategies in Mexican spotted owl habitat.
- Resource managers should establish and enforce residual vegetation (e.g., residual leaf length or stubble height) standards during plant growth and dormant periods that are consistent with light to moderate grazing intensity within protected and replacement habitats. Use range management monitoring standards developed for local geographic areas and habitat types (e.g., USFS Region 3, Range Analysis Handbook, Rangeland Analysis Management and Training Guide) based on current vegetation conditions, and establish allowable use and residual vegetation levels that will expedite attaining or maintain desired habitat conditions affected by livestock management. Established standards should be attained at a minimum in at least four out of every five years, should be reviewed by resource managers periodically (every five to seven years) to determine if desired vegetation conditions are being achieved or maintained, and should be modified appropriately when vegetation conditions indicate the need. Specific protocols should be used where they have been developed to monitor habitat conditions for the owl's prey.

- Resource managers should implement grazing and other management strategies for livestock and wild ungulates that will improve degraded riparian communities in owl habitats to proper functioning condition as soon as possible and implement monitoring programs to evaluate improvement in habitat conditions. Sensitive riparian areas such as stream-riparian habitats, wetlands, wet meadows, springs, and seeps may not be able to support high grazing intensity and may require special management as a “critical area” as defined by the Society for Range Management (1998) for short (e.g., a season or year) to indefinite time periods to help promote vegetation conditions suitable for owl prey species and/or recovery of nest/roost habitat provided by riparian vegetation.
- Management strategies may include:
 - *Exclusion of Grazing.* Total exclusion of ungulate grazing use (i.e., either livestock or both livestock and wild ungulates) from sensitive riparian areas for extended time periods (e.g., multiple years) through the use of exclusion fencing to improve riparian herbaceous plant cover, promote regeneration of riparian shrub and tree cover, and protect stream banks and channels;
 - *Reduce Grazing Pressure.* Reductions in grazing intensity in riparian areas through the use and enforcement of appropriate vegetation utilization or residual vegetation standards and timely livestock removal;
 - *Seasonal Grazing.* Changes in seasons of grazing use (e.g., allow livestock grazing in riparian areas only during plant dormancy periods where possible); and
 - *Reduce Numbers.* Reduction in numbers of grazing animals (i.e., both livestock and wild ungulates if needed) to attain sufficient residual riparian vegetation levels and improvement in riparian habitat conditions.

Site Specific Conservation Measures: Southwestern Willow Flycatcher

Grazing in Southwestern willow flycatcher habitats within the analysis are will occur during the non-growing season as follows: Conservative grazing with average utilization not to exceed 35 percent of palatable, perennial grasses and grass-like plants in uplands and riparian habitats, and extent of alterable stream banks showing damage from livestock use not to exceed 10 percent. Woody utilization is not to exceed 40 percent on average (USFWS 2002) of native broadleaf trees, shrubs and half-shrubs (site specific conditions).

- Define the non-growing season as from leaf drop to bud break of common riparian species (USFWS 2002).
- The defined period for use of the Salt River will be from Nov 15th to Feb 15th.
- Promote the growth of Southwestern willow flycatcher habitat that contains native vegetation so that Southwestern willow flycatchers may expand their numbers on the Forest (USFWS 2011).
- Grazing in uplands and watersheds draining into southwestern willow flycatcher habitats. Average utilization of palatable, perennial grasses and grass-like plants not to exceed 30 to 40 percent. Use stubble height guidelines: 3 in. for short grass, 6 in. for midgrass, 12 in. for tall grass. Determine monitoring species prior to grazing (USFWS 2002).
- If grazing is authorized a monitoring plan must be implemented that assures that the winter grazing system is not preventing regeneration of woody and herbaceous riparian vegetation. Monitoring will include both grazed and excluded areas (USFWS 2002).
- Monitoring will also include monitoring incidental take resulting from the proposed action if any is issued and reporting monitoring results to the FWS. Incidental take (implementation) monitoring shall include information such as when or if the project was

implemented, whether the project was implemented as analyzed in the site-specific biological opinion (including Conservation Measures and Best Management Practices), breeding season(s) over which the project occurred, relevant Southwestern willow flycatcher survey information, and any other pertinent information about the project's effects on the species (USFWS 2012).

- A pasture rotation will be used so cattle from different allotments will not use the same area at the same time. An example of a pasture rotation along the river is provided below for those allotments on opposite sides of the river. This example allows for sufficient rest and recovery without both sides being used at the same time, thereby reducing impacts and potential conflicts to resources. Adaptive management would be used to maintain utilization guidelines and allow for sufficient regrowth and recovery while allowing for equal grazing opportunities along the river. Actual grazing rotations would be established annually through operating instructions and coordinated between districts and permittees.

Table 30: Grazing rotation in river pastures across from Tonto Basin Ranger District through 2019

River Pastures across from TBRD	2013	2014	2015	2016	2017	2018	2019
Shute Springs	X			x			x
Ortega		x			x		
4Y			x			x	
Lower Dry Creek		X			X		
Dagger	x			x			x
West Devore			x			x	

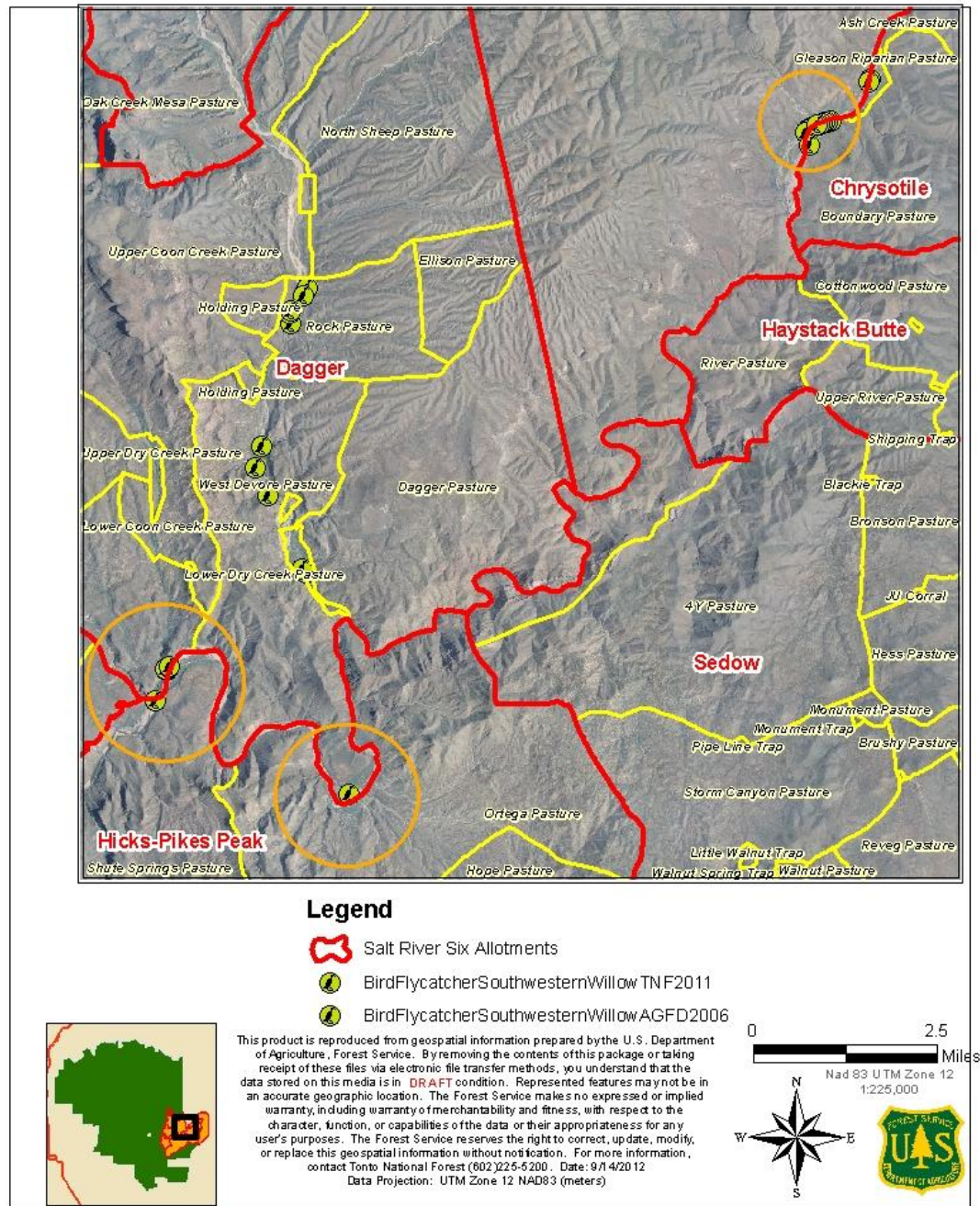
General Recommendations: From the Southwestern Willow Flycatcher Recovery Plan (USFWS 2002)

- Identify the most important riparian areas for the recovery of the southwestern willow flycatcher and riparian and aquatic organisms in general.
- Identify the most appropriate areas for permitting livestock grazing given the biodiversity concerns for the particular land management unit.
- Reconfigure grazing pasture boundaries to reflect the true productivity of rangelands associated with important flycatcher recovery areas, and allow differential management of units of varying ecological sensitivity.
- Exclude livestock from sites where exclusion would result in the greatest ecological improvement and least economic loss.
- If monitoring is less than annual, establish livestock use numbers based on drought years, not the average or wettest years, to provide for livestock operations that are viable given this region's propensity to experience prolonged drought. With annual monitoring, adjust livestock levels in response to reduced forage availability, poor vigor and physiological stress on forage plants, and/or decreased cover brought on by drought conditions.
- Establish an adequate number of ungrazed areas at different elevation and geomorphic settings. These will provide land management agencies and researchers with a much-needed series of sites against which to compare the condition of grazed watersheds (Brinson and Rheinhardt 1996) (see below).

Appendix C: Wildlife Tables and Conservation Measures

- Institute and/or improve record-keeping and documentation of grazing practices, retroactively where possible, so that the ecological effectiveness of various grazing practices can be more scientifically evaluated (see below).
- Work with state universities, private colleges, and research institutions to fund and facilitate research that better defines the ecological and hydrological effects and sustainability of livestock grazing in southwestern ecosystems, particularly southwestern riparian ecosystems.

This map shows key areas (orange circles) for Southwestern willow flycatcher along Salt River



Appendix C: Wildlife Tables and Conservation Measures

This map shows where natural boundary and a fence (orange line) could be places to break up the Oak Creek Mesa Pasture on Dagger Allotment to alleviate effects to MSO, sensitive plants, and CLF habitat

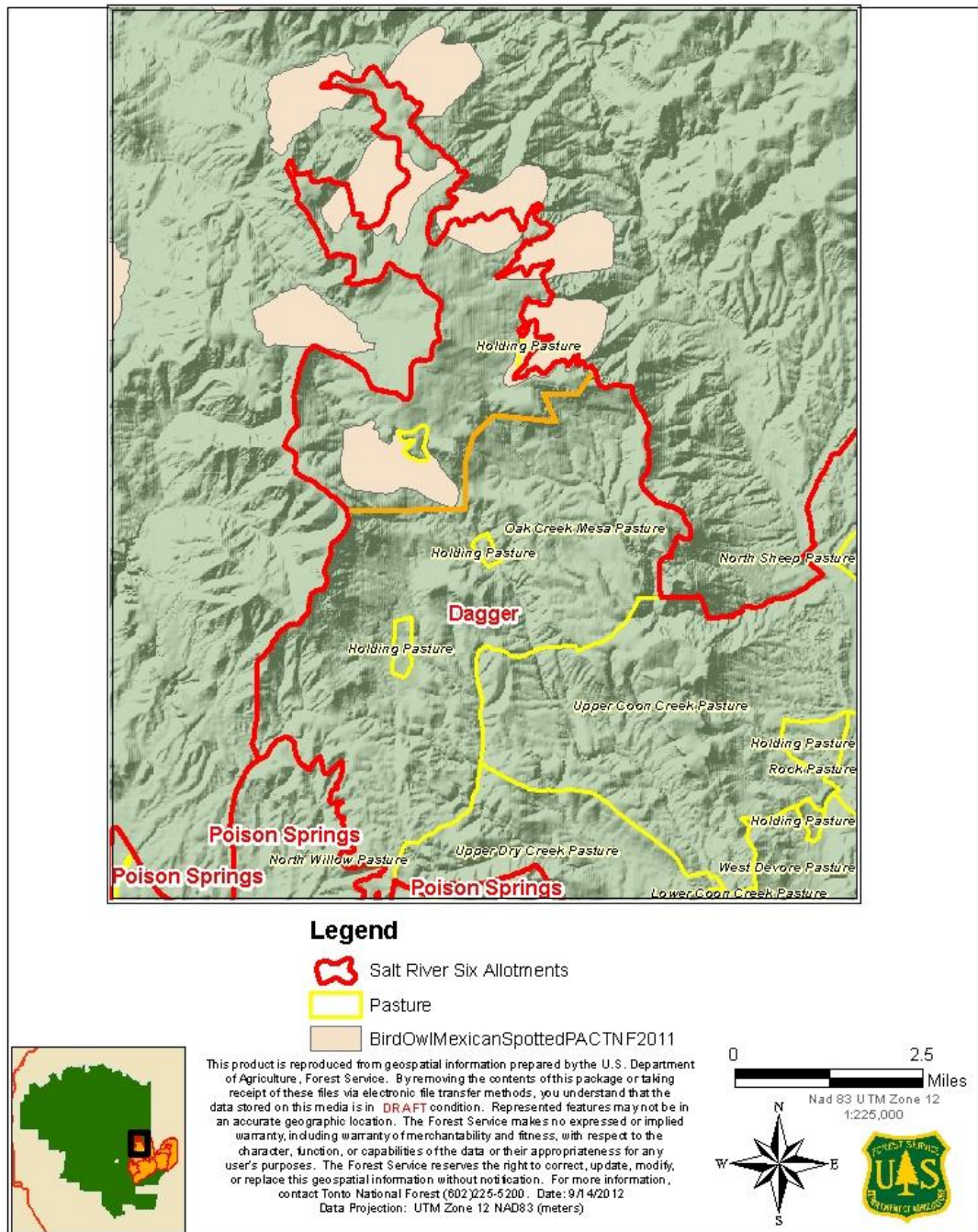


Table 31: General guidelines for domestic livestock grazing in Southwestern willow flycatcher habitat 31

Site Conditions			Site-specific Guidelines	
Habitat Status	Flycatcher Status	Season	Low-Stature Habitat: 3-4m shrubby willow	All other habitat types #1830 m or 6000 ft. elevation
1. Restorable or Regenerating Habitat ¹	1A: Unoccupied	Growing season ²	No grazing	No grazing
	1B: Unoccupied	Non-growing season	No grazing	Provisional grazing ³ (assumes grazing is not a major stressor).
2. Suitable Habitat	2A: Unoccupied	Growing season	No grazing	No grazing, but at discretion of USFWS, provision for a limited number of small-scale, well-designed experiments to determine levels of pre-breeding season grazing that do not adversely affect Southwestern willow flycatcher habitat attributes. Grazing not to exceed 35 percent utilization of palatable, perennial grass or grass-like plants in uplands and riparian habitats, and extent of alterable stream banks showing damage from livestock use ⁴ not to exceed 10 percent. ⁵
	2B: Unoccupied	Non-growing season	Conservative grazing with average utilization not to exceed 35 percent of palatable, perennial grasses and grasslike plants in uplands and riparian habitats, and extent of alterable stream banks showing damage from livestock use not to exceed 10 percent. Woody utilization not to exceed 40 percent on average.	Conservative grazing with average utilization not to exceed 35 percent of palatable, perennial grasses and grass-like plants in uplands and riparian habitats, and extent of alterable stream banks showing damage from livestock use not to exceed 10 percent. Woody utilization not to exceed 40 percent on average.

Site Conditions			Site-specific Guidelines	
Habitat Status	Flycatcher Status	Season	Low-Stature Habitat: 3-4m shrubby willow	All other habitat types #1830 m or 6000 ft. elevation
	2C: Occupied	Growing Season	No grazing	No grazing until research in comparable unoccupied habitat demonstrates no adverse impact; if unoccupied habitat becomes occupied habitat, continue existing management (grazing should not exceed 35 percent of palatable, perennial grasses and grass-like plants in uplands and riparian habitats, and extent of alterable stream banks showing damage from livestock use not to exceed 10 percent).
	2D: Occupied	Non-growing season	No grazing	Conservative grazing with average utilization not to exceed 35 percent of palatable, perennial grasses and grass-like plants in uplands and riparian habitats, and extent of alterable stream banks showing damage from livestock use not to exceed 10 percent. Woody utilization not to exceed 40 percent on average.
3. Uplands & Watershed Condition ⁶	3: Occupied and unoccupied	For any season of use	Average utilization of palatable, perennial grasses and grass-like plants not to exceed 30 to 40 percent. Use stubble height guidelines: 3 in. for short grass, 6 in. for midgrass, 12 in. for tall grass. Determine monitoring species prior to grazing.	Average utilization of palatable, perennial grasses and grass-like plants not to exceed 30-40 percent. Use stubble height guidelines: 3 in. for short grass, 6 in. for midgrass, 12 in. for tall grass. Determine monitoring species prior to grazing.

¹ "Restorable" means riparian systems that are degraded but have the appropriate hydrological and ecological setting to be restored to suitable flycatcher habitat, and could be restored with reasonable costs and actions. Lack of regeneration due to grazing is one factor contributing to habitat degradation; conditions in each habitat should include adequate plant regeneration to ensure habitat sustainability into the future. At these sites, flycatcher habitat is precluded largely or solely by livestock impacts. "Restorable" habitats are those that would be suitable if not

for grazing, alone or in combination with other major stressors. This means cessation of grazing is a necessary, but not necessarily a sufficient action.

2 Growing season is defined as bud break to leaf drop for cottonwood and willow species. Non-growing season is defined as leaf drop to bud break for cottonwood and willow species.

3 Grazing should only be conducted if it is not a major stressor and does not preclude satisfactory progress toward suitability.

4 Damage to stream banks from livestock use includes: bank chiseling, trampling, trailing, soil compaction, breakage of vegetation, bank sloughing, etc.

5 Alterable stream banks are those portions of banks containing exposed soil or vegetation and not composed of bedrock, boulders, or large cobbles (USFWS 2002).

6 Uplands and watersheds, or portions of watersheds, associated with areas identified as restorable, regenerating, or suitable Southwestern willow flycatcher habitat. General guidelines should be implemented unless site-specific data clearly indicate that deviation from the guidelines will not prevent or slow progression toward suitability and/or maintenance of suitable habitat conditions.

The guidance provided in table 2 is based on the current endangered status of the Southwestern willow flycatcher. Flexibility will increase with the eventual downlisting of the flycatcher to threatened status. Overall, the best available information suggests that flycatcher recovery is most assured with no grazing in its habitat during the growing season. In some situations, some light to moderate levels of grazing during the non-growing season may be compatible with flycatcher recovery, if carefully managed and closely monitored. Where grazing is indicated in table 2, the following set of conditions applies:

- All grazing is to be accompanied by monitoring. If funding is not sufficient to allow monitoring, then grazing should be discontinued. Monitoring should include exclosed areas, where possible, in riparian habitat on allotments or pastures where grazing has been discontinued, as well as allotments or pastures where grazing is allowed to continue.
- The target for total utilization of palatable, perennial grasses and grass-like plants should not exceed 35 percent (± 5 percent to accommodate sampling error) in upland and riparian habitats. Utilization of 35 percent not only includes direct consumption, but also includes other factors associated with herbivory (e.g., trampling, trailing, bedding). With monitoring, stocking rates may be adjusted to current forage production each year (White and McGinty 1997).
- Stubble height baselines should have a forage/acre figure associated with them, if possible, so the baseline is not established for areas that are too poor to graze.
- Annuals are excluded from the forage base because reliance on annuals indicates overuse of perennial grasses and grass-like plants and woody riparian vegetation.
- The target for utilization of woody vegetation at the pasture level is 40 percent (± 10 percent to accommodate sampling error), meaning the removal of 40 percent of the biomass of the current year's growth. This not only includes direct consumption but also includes other factors associated with herbivory (e.g., trampling, breakage of vegetation).

Conservation Measures: Chiricahua Leopard Frog (USFWS 2011)

- To avoid direct and indirect adverse effects associated with livestock activities:
 - No grazing or livestock management activities will occur in occupied habitat or where the frog is reasonably likely to occur, including aquatic sites and potential dispersal corridors where the frog is reasonably likely to occur.
 - No grazing or livestock management activities will occur in occupied watersheds.
- To minimize effects (and take) associated with maintenance and livestock use of stock tanks within dispersal distance from occupied sites:
 - All earthen stock tanks within reasonable dispersal distance of occupied habitat will be surveyed for Chiricahua leopard frogs prior to maintenance activities.
 - Where frogs are present in stock tanks needing maintenance, coordinate with the USFWS to develop and implement a site specific plan to either: 1) forego maintenance; 2) salvage and temporarily hold frogs (following recovery plan guidance); 3) limit disturbance and work areas to the minimum practicable (i.e., leave stands of emergent vegetation in place, implement measures to minimize the likelihood of disease transmission); 4) fence portions of the occupied pond or tank (portions may be left unfenced to allow some access by livestock); or 5) otherwise develop a comprehensive plan as part of the proposed action to provide necessary tank maintenance that addresses protection of Chiricahua leopard frogs.
 - Where frogs are present, implement recommendations and guidance provided in the recovery plan for stock tank use and maintenance.

- To minimize adverse effects (and take) associated with grazing within occupied habitat (or habitat where the frog is reasonably likely to occur) that is not already excluded from livestock:
 - Identify habitats and survey suitable habitats for the presence of frogs (using protocol in the recovery plan, appendix E) prior to livestock entry, or work with USFWS to establish a specified time frame in which surveys will be completed.
 - Where frogs are found, coordinate with USFWS to develop a site-specific plan to either: 1) ensure that Chiricahua leopard frog habitat will be maintained, or 2) preclude grazing from the site. This may involve constructing alternate water source(s) for livestock (see recovery plan, appendix A).
 - Water shall not be pumped or diverted from a site occupied by Chiricahua leopard frogs.
 - To minimize trampling and/or ingestion of frogs, metamorphosing frogs, larvae, and eggs in occupied habitat, protect stock tanks sufficiently to permit regeneration of emergent and submergent vegetation.
- To minimize the contamination of occupied Chiricahua leopard frog habitat by non-native species and Bd:
 - Where new or existing sites occupied by Chiricahua leopard frogs occur, water shall not be hauled to the site from another aquatic site that supports leopard frogs, bullfrogs, tiger salamanders, crayfish, or fish.
 - To avoid the transfer of Bd, water hauled to occupied sites should originate from sources either within the same drainage as the target site, or preferably from ground water or domestic/treated sources.
 - The permittees and their employees will be instructed to sanitize (following recovery plan recommendations) or dry out equipment used in maintenance of stock tanks or after other activities occurring in wetland or riparian areas prior to visiting occupied sites to prevent the spread of chytridiomycosis.
 - When new tanks are to be constructed, coordinate with AGFD or NMDGF and USFWS to identify known locations of non-native aquatic species in relation to the proposed new tanks. Assess the threats and review the locations of the new tanks based on the occurrence of non-native species and their likely dispersal ranges.
 - Live fish, crayfish, bullfrogs, leopard frogs, salamanders, or other aquatic organisms shall not be intentionally moved by permittees or their employees among livestock tanks or other aquatic sites.
- To reduce adverse effects to aquatic sites from livestock impacts in surrounding uplands (e.g., sediment input to occupied habitats):
 - Apply utilization standards (e.g., forage use guidelines) or other accepted methods to ensure upland and riparian vegetation conditions provide filtration of sediments and protect bank stability. Identify a means of monitoring the standard or method and identify action that will be taken to prevent exceeding the standard.
 - Establish a non-grazed buffer around or along occupied aquatic sites sufficient to adequately filter sediments and excrement generated by livestock use of surrounding uplands.
- To reduce adverse effects to occupied habitats from other land treatments associated with livestock management (e.g., herbicide application, prescribed fire, road construction), incorporate measures such as buffers around drainages (upstream and downstream of occupied sites), erosion control structures, and buffers around the sites themselves. If herbicides are proposed, use recommendations from White (2004).

- To reduce adverse effects to frogs that may disperse from occupied sites to unoccupied sites within the action area:
 - Identify likely or potential dispersal corridors with the assistance of Recovery Team/USFWS personnel. Include uplands, and ephemeral and perennial drainages within accepted dispersal distances.
 - Protect these habitats from livestock use or concentrations of livestock during likely times of dispersal, or minimize impacts from livestock and associated land treatments to these habitats during those times.
- To promote the conservation of the species, evaluate suitable habitat to identify potential recovery sites, particularly if the grazing allotment lies within a Management Area. Work with USFWS and the Recovery Team to investigate such opportunities. If such sites are identified and are not already considered among habitats where frogs are reasonably likely to occur during the life of the grazing project, protect them as if they were occupied (see Recovery Actions 1.1-1.4 and 2 in the recovery plan) and include them in effects analyses as such.

Appendix D - Recreation Tables and Definitions

Recreation Opportunity Class (ROS) Characterization

Primitive (P)	Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and control. Motorized use within the area is not permitted.
Semi-Primitive Non-Motorized (SP)	Area is characterized by a predominantly natural or natural-appearing environment of moderate-to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but is subtle. Motorized use is not permitted.
Semi-Primitive Motorized (SPM)	Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restriction may be present, but is subtle. Motorized use is permitted.
Roaded Natural (RN)	Area is characterized by predominantly natural-appearing environments with moderate evidences of sight and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.
Rural (R)	Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sight and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided for away from developed sites. Facilities for intensified motorized use and parking are available.
Urban (U)	Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Resource modification and utilization practices are to enhance specific recreational activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available, with forms of mass transit often available to carry people throughout the site.

Wilderness Opportunity Spectrum Objective

Descriptions

Opportunities Classes represents a spectrum of wilderness experience opportunities within the complex. These classes describe areas within the complex having different resource and social objectives and also identify management actions that are acceptable within each class. Inherent in the definitions are different levels of resource and social conditions acceptable for each class in the spectrum.

Three components are used to describe opportunity classes: resource, social, and managerial settings. Each component has several elements that are used to describe differences between opportunity classes. These descriptions provide managers, researchers, and users with common definitions for terms used to describe areas within the complex.

The following are definitions of each class including descriptions of the objectives for the resource, social, and managerial settings.

I. OPPORTUNITY CLASS I

A. Resource Setting

Characterized by an unmodified natural environment. Ecological and natural processes are not measurably affected by the actions of users. Environmental impacts are minimal, restricted to temporary loss of vegetation here camping occurs and along some livestock travel routes, typically recover on an annual basis and are subtle in nature and generally not apparent to most visitors.

B. Social Setting

Provides an outstanding opportunity for isolation and solitude free from evidence of human activities and with very infrequent encounters with users. The user has outstanding opportunities to travel across country utilizing a maximum degree of outdoor skills, often in an environment that offers a very high degree of challenge, self-reliance and risk. Inter-party contacts will be very few while traveling and rare to non-existent at the campsite.

C. Managerial Setting

Management will strongly emphasize sustaining and enhancing the natural ecosystem. Direct onsite management of visitors will be seldom. Necessary rules and regulations will be communicated to visitors outside the area, such as at trailheads or boundary portals. Contact of visitors within this class by Forest personnel will be mostly reactive and by invitation, with discussion items limited to what visitors want to know. Formal and informal user education programs will be initiated to inform users about what to expect and how to use the area for optimum benefits to all. Formal regulations, orders and/or permits will be considered only when less restrictive regulations or programs have consistently failed to achieve desired goals and objectives.

Infrequent patrols and monitoring of conditions by appropriate State and Federal agency personnel will be conducted only as necessary to achieve management objectives. All scientific and ecological monitoring actions will be scheduled to

meet social setting criteria. Trails will not be constructed and maintenance will be conducted only to protect the resource. No trail signs will be present, and no facilities of any kind will be provided or permitted, including lookouts and radio transmitter stations.

II. OPPORTUNITY CLASS II

A. Resource Setting

Characterized by an essentially natural environment. Ecological and natural processes and conditions are minimally affected by the action of users. Environmental impacts are low and restricted to minor losses of vegetation where camping occurs and along most travel routes. Most impacts recover on an annual basis and will be apparent to only a low number of visitors.

B. Social Setting

Provides a high opportunity for exploring and experiencing isolation from the sights and sounds of man with the probability for encountering other users being low. The user has good opportunity for experiencing independence, closeness to nature, tranquility, and self-reliance through the application of primitive recreation skills. These opportunities occur in an environment that offers a high degree of challenge and risk. Inter-party contacts will be low on the trail and fairly low at the campsite, with parties often camped in isolation.

C. Managerial Setting

Management will emphasize sustaining and enhancing the natural ecosystem. Direct onsite management will involve minimum visitor contact during the normal season. Necessary rules and regulations will be communicated to visitors outside the area, such as at trailhead and boundary portals. Contacts of visitors by Forest personnel will be mostly reactive and by invitation. In addition to what the visitor wants to know, the opportunity will be seized to present other pertinent site-specific messages. Formal and informal user education programs will be initiated to inform users about what to expect and how to use the area for optimum benefits to all. Formal rules and regulations may be necessary to achieve desired goals and objectives. Signs will be permitted within the area and will provide only the minimum information necessary to protect the wilderness resource. Trails will normally be constructed, maintained and managed to accommodate light and infrequent travel. Routes will be maintained only for resource protection and minimal user safety. Modification of the natural environment would be minimal. The route should provide the user with an opportunity for testing skills and experiencing a sensation of physical exertion and feeling of accomplishment. Facilities will be provided, only in a few extreme cases, and those that are will be permitted only for resource protection and will use only native materials.

III. OPPORTUNITY CLASS III

A. Resource Setting

Characterized by an essentially unmodified natural environment where ecological and natural processes are in a few areas moderately affected by the action of the

users. Environmental impacts are moderate, with most areas along the travel routes and near campsites showing moderate losses of vegetation. Impacts in some areas often persist from year to year and are apparent to a moderate number of visitors.

B. Social Setting

Moderate opportunities for exploring and experiencing isolation from the sights and sounds of man, with the probability of encountering others users low to moderate. The user has moderate opportunities for experiencing independence, closeness to nature, tranquility and self-reliance through the application of primitive recreation skills. These opportunities occur in a natural environment that normally offers a moderate degree of challenge and risk. Contact with other visitors both on the trail and while camped will be moderately frequent.

C. Managerial Setting

Management will emphasize sustaining and enhancing the natural ecosystem. Onsite management will involve routine visitors contact. Necessary rules and regulations will be communicated to visitors outside the area, such as at trailheads and boundary portals. Forest personnel initiate contact during routine duties. Information concerning protection of site-specific wilderness resources will be presented. Formal and informal user education programs will be initiated to inform users about what to expect and how to use the area for optimum benefits to all. Formal rules and regulation may be necessary to achieve management objectives and permits may be considered only when lighthanded, less restricted measures have failed to achieve desired goals and objectives. Signs will be permitted within the area and will include the minimum number necessary to protect the wilderness resource, and for administration. Trails will normally be constructed, maintained, and managed to accommodate moderate use for the majority of the use season. The route will only modify natural conditions to the extent necessary to protect the environment and provide for moderately safe use by a user with limited experience and average physical ability. A moderate number of facilities will be provided or permitted, and only those necessary for the protection of the wilderness resource and the user. Natural materials will dominate. Dimensional and non-native materials may be used but must remain not evident to the average user.

IV. OPPORTUNITY CLASS IV

A. Resource Setting

Characterized by a predominantly unmodified natural environment where ecological and natural processes are in many locations substantially affected by the action of users. Environmental impacts are generally high in areas along major travel routes, along popular river corridors and lakeshores, and near major entry points. Impacts often persist from year to year and there may be moderate loss of vegetation and soil at some sites. Impacts are readily apparent to most visitors.

B. Social Setting

Moderate to low opportunities for exploring and experiencing isolation from the sights and sounds of man with the probability of encountering other area users moderate to high. The user has the opportunity for a high degree of interaction with the natural environment, often with low or moderate challenge and risk. Contact with other users will be relatively high much of the time, both on the trail and at campsites. Some parties will camp out of sight and sound of other parties, but this will not be common during the main use season.

C. Managerial Setting

Management will be oriented to sustaining and enhancing the natural ecosystem. There will be frequent opportunity for visitor contact with management personnel. Necessary rules and regulations will be communicated to visitors outside the area, such as the trailheads and boundary portals. Special efforts will be taken to contact visitors. Information concerning wilderness management, user conflicts, fire prevention, and other pertinent subjects will be presented. Formal and informal user education programs will be initiated to inform users about what to expect and how to use the area for optimum benefit to all. Formal rules and regulations may be necessary to achieve management objectives and permits may be considered only when light-handed, less restricted measures have failed to achieve desired goals and objectives. Signs within the wilderness will be placed to aid in distributing and dispersing use, and for resource protection purposes. Trails will normally be constructed, maintained, and managed to accommodate heavy traffic for the majority of the use season. The routes will blend into the natural features of the area. Facilities and improvements may be provided and permitted for resource protection, user safety, and limited user convenience. Facilities when constructed will emphasize the use of natural materials. Dimensional and non-native materials are acceptable but should harmonize with the natural environment.

Visual Quality Objective Class (VQO) Characterization

VQO Class Characterization

Retention (R): A Visual Quality Objective that in general means man's activities are not evident to the casual forest visitor.

Partial Retention (PR): A Visual Quality Objective that in general means man's activities may be evident but remain subordinate to the characteristic landscape.

Modification (M): A Visual Quality Objective meaning man's activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in the foreground or middle ground.

Maximum Modification (MM): A Visual Quality Objective meaning man's activities may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

Preservation (P): A Visual Quality Objective that provides for ecological changes only.

Table 32: Salt River Regulations by river segment

Salt River Regulations		
Abbreviated Regulation	Segment	CFR
Boating permit required March 1 to May 15	Wilderness	36 CFR 261.57(a)
Must remove human solid waste	Salt Banks, Gleason, Wilderness	36 CFR 261.57(g)
No wheeled vehicles	Wilderness	36 CFR 261.57(h)
Group size of 15 or less	Wilderness	36 CFR 261.58(f)
Group size of 25 or less	Salt Banks, Gleason	36 CFR 261.58(f)
No camping at Walnut Falls	Gleason	36 CFR 261.58(e)
Campfire must be contained in firepan	Salt Banks, Gleason, Wilderness	36 CFR 261.52(a)
Indigenous plants dead and down only	Salt Banks, Gleason, Wilderness	36 CFR 261.58(t)
No littering	Salt Banks, Gleason, Wilderness	36 CFR 261.57(g)

Table 33: Salt River Allotment Analysis by Class with acreages, and number and miles of roads and trails

Salt River Allotment Analysis Area ROS / WOS Acres / Roads / Trails						
Class	Acres	Percentage	# of Roads	Miles Road	# Trails	Miles Trail
SPNM	137,435	49.82%	69	77.24	8	20.70
SPM	72,416	26.25%	130	168.28	2	2.41
RN	63,274	22.94%	174	211.41	6	3.64
R	2,731	0.99%	6	3.26	0	0
ROS Total	275,856	100%	279	460.19	9	26.75
WOS I	29,471	70.82%	N/A	N/A	6	3.25
WOS II	11,931	28.67%	N/A	N/A	7	19.12
WOS III	148	0.35%	N/A	N/A	2	0.57
WOS IV	66	0.15%	N/A	N/A	2	0.23
WOS Total	41,616	100%	N/A	N/A	9	23.17
Total	275.856	100%	279	460.19	9	26.75

Appendix E - Rangeland Management Definitions

Definitions as provided in FSH 2209.13, Chapter 90

Adaptive Management is a formal, systematic, and rigorous approach to learning from the outcomes of management actions, accommodating change, and improving management. See figure 1.

Reference: Nyberg, J.B., Forest Practices Branch, BC Forest Service. An Introductory Guide to Adaptive Management for Project Leaders and Participants, January 1999.

Apparent Trend. An interpretation of trend based on observation and professional judgment at a single point in time.* An assessment, using professional judgment, based on a one-time observation. It includes consideration of such factors as plant vigor, abundance of seedlings and young plants, accumulation or lack of plant residues on the soil surface, and soil surface characteristics (i.e., crusting, gravel pavement, pedestalled plants, and sheet or rill erosion). Interagency Technical Reference 1734-4

Benchmark. A permanent reference point, in range inventory and effectiveness (trend) monitoring, it is used as a point where changes in vegetation, in response to applied management through time, are measured. Adapted from “A Glossary of Terms Used in Range Management.” Fourth Edition, edited by the Glossary Update Task Group, Society for Range Management, Thomas E. Bedell, Chairman. 1998. Second Printing 2003.

Deferment. The delay of grazing to achieve a specific management objective. A strategy aimed at providing time for plant reproduction, establishment of new plants, restoration of plant vigor, a return to environmental conditions appropriate for grazing, or the accumulation of forage for later use. *

Deferred Grazing. The deferment of grazing in a non-systematic rotation with other land units. *

Deferred-Rotation. Any grazing system, which provides for a systematic rotation of the deferment among pastures. *

Desired Conditions. Descriptions of the social, economic and ecological attributes that characterize or exemplify the desired outcome of land management. They are aspirational and likely to vary both in time and space. Adapted from: *Foundations of Forest Planning: Volume 1 (Version 2.0) Model of a Forest Plan*. USDA Forest Service, January 2005

Ecological Site (ES) is a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and its response to management.* Also refer to the National Range and Pasture Handbook, USDA, Natural Resources Conservation Service, page 3.1.

Ecological Site Description (ESD) ESDs contain information about soil, physical features, climatic features, associated hydrologic features, plant communities possible on the site, plant community dynamics, annual production estimates and distribution of production throughout the year, associated animal communities, associated and similar sites, and interpretations for management. ESDs are narratives and map units containing ecological sites. Many ESDs also have State and Transition Models developed for them. Refer to the National Range and Pasture Handbook, USDA, Natural Resources Conservation Service, page 3.1-1.

Ecological Type is a category of lands with a distinctive (i.e., mappable) combination of landscape elements. The elements making up an ecological type are climate, geology, geomorphology, soils, and potential natural vegetation. Ecological types differ from each other in

their ability to produce vegetation and respond to management and natural disturbances. (Terrestrial Ecological Unit Inventory Technical Guide: Landscape and Land Unit Scales, USDA Forest Service, Gen Tech Report WO-68, 2005)

Ecological Units. Map units designed to identify land and water areas at different levels of resolution based on similar capabilities and potentials for response to management and natural disturbance. These capabilities and potentials derive from multiple elements: climate, geomorphology, geology, soils and potential natural vegetation. Ecological units should, by design, be rather stable. They may, however, be refined or updated as better information becomes available. (Terrestrial Ecological Unit Inventory Technical Guide: Landscape and Land Unit Scales, USDA Forest Service, Gen Tech Report WO-68, 2005)

Frequency (as a management tool) refers to the number of times forage plants are defoliated during the grazing period. Reed Floyd, Roy Roath, and Dave Bradford. 1999. The Grazing Response Index: A Simple and Effective Method to Evaluate Grazing Impacts. *Rangelands* 21(4): 3-6.

Frequency (as a measurement for trend) The ratio between the number of sample units that contain a species and the total number of sample units.*

Grazing Intensity is the degree of herbage removed through grazing and trampling by livestock. Grazing intensity may be described in terms herbage removed during the grazing and/or growing period or as a utilization level at the end of the growing period. It is important to clearly define how intensity is being viewed and described. Removal of leaf material, when the plant is actively growing can affect root growth which in turn affects future leaf growth. Sufficient leaf area is essential to support plant functions through photosynthesis. Heavy to severe intensity or utilization can affect current plant development and growth, as well as growth during subsequent growing seasons.

Grazing Intensity is discussed by Holechek (reference 1 below):

- **Light-** Only choice plants are used. There is no use of poor forage plants. The range appears practically undisturbed.
- **Moderate-** About half of the good and fair forage value plants are used. There is little evidence of livestock trailing and most of the accessible range shows some use.
- **Heavy-** Range has a clipped or mowed appearance. Over half of the fair and poor value forage plants are used. All accessible parts of the range show use and key areas are closely cropped. They may appear stripped if grazing is very severe and there is evidence of livestock trailing to forage.

The above descriptions may be especially helpful when reviewing grazing during the growing season.

Additional qualitative assessment of grazing intensity can be determined using the Landscape Appearance Method. It can be found in the Interagency Technical Reference 1734-3 *Utilization Studies and Residual Measurements* Page 119.

Grazing Intensity as depicted as a utilization level at the end of the growing season as discussed by Holechek, (Reference 2 below):

Light to non-use	0-30 percent
Conservative	31-40 percent
Moderate	41-50 percent
Heavy	51-60 percent
Severe	61+ percent

References:

(1) Holechek, Jerry L., Rex D. Pieper, and Carlton H. Herbel. 2004. Range Management, Principles & Practices. Prentice Hall page 248.

(2) Holechek, Jerry L. and Dee Galt. 2000. Grazing Intensity Guidelines. *Rangelands* 22(3): 11-14.

An additional qualitative grazing assessment and planning tool is the Grazing Response Index (GRI). Reed Floyd, Roy Roath, and Dave Bradford. 1999. The Grazing Response Index: A Simple and Effective Method to Evaluate Grazing Impacts. *Rangelands* 21(4): 3-6.

Grazing Occurrence is how often a given area is grazed. How often a pasture is exposed to grazing or rested from grazing provides for different responses within the plant community due to differing opportunities for plant recovery.

Grazing Period is defined as the length of time grazing livestock or wildlife occupy a specific land area. * The length of time a pasture is exposed to grazing affects many variables such as potential for regrowth of plant material, soil impacts and animal behavior. The grazing period influences the **intensity** of grazing and the **frequency** of grazing. It can also influence items tied to animal behavior such as trailing, and trampling such as between loafing and watering areas.

Key Area A relatively small portion of a range selected because of its location, use or grazing value as a monitoring point for grazing use. It is assumed that key areas, if properly selected, will reflect the overall acceptability of current grazing management over the range. *

Key Species (1) Forage species whose use serves as an indicator to the degree of use of associated species. (2) The species which must, because of their importance, be considered in the management program.*

Monitoring The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives. This process must be conducted over time in order to determine whether or not management objectives are being met. *

Implementation Monitoring- This short-term monitoring answers the question, was the management implemented as designed. Annually documents several items. Examples include:

- 1) Were management actions implemented as designed, and
- 2) Did the management actions achieve the annual effect expected?

Appendix E: Rangeland Management Definitions

Items which may be documented through implementation monitoring include, but are not limited to: actual use (livestock numbers and days), condition of range improvements, utilization, wildlife observations.

Effectiveness Monitoring- This long-term monitoring documents whether management actions are having the expected progress towards achieving resource management objectives.

Resource Management Objectives are concise statements of measurable, time –specific outcomes intended to achieve desired conditions. The objectives for a plan are the means of measuring progress toward achieving or maintaining desired conditions. Adapted from: *Foundations of Forest Planning: Volume 1 (Version 2.0) Model of a Forest Plan*. USDA Forest Service, January 2005

A good objective is "**SMART**": **Specific** in what it will accomplish; **Measurable** in what it will produce; **Achievable** (has a good chance of being carried out); **Realistic** within the given time frame and budget; and **Timefixed** (has an endpoint). Leslie, M. G.K. Meffe, J.L. Hardesty, and D.L. Adams 1996. *Conserving Biodiversity on Military Lands: A Handbook for Natural Resources Managers*. The Nature Conservancy, Arlington, VA.

Rest is to leave an area of grazing land ungrazed or unharvested for a specific time, such as a year, a growing season or a specified period required within a particular management practice. *

Rest-Rotation. A grazing management scheme in which rest periods for individual pastures, paddocks or grazing units, generally for the full growing season, are incorporated in a grazing rotation. *

Seasonal Utilization is the amount of utilization that has occurred before the end of the growing season. Interagency Technical Reference 1734-3, page 1.

Terrestrial Ecosystem Survey Terrestrial Ecosystem Unit Inventory: (TES/TEUI): is the systematic examination, description, classification, mapping and interpretation of terrestrial ecosystems. A terrestrial ecosystem is an integrated representation of soil, climate and vegetation as modified by geology, geomorphology, landform and disturbance processes. Refer to Terrestrial Ecological Unit Inventory Technical Guide: Landscape and Land Unit Scales, USDA Forest Service, Gen Tech Report WO-68, 2005.

Timing is the time of season grazing occurs relative to the phenological stage of plant development, such as early growth period, reproductive period, or dormant period. Disturbance, such as that from grazing, may provide differing responses within the plant depending upon the stage of development.

Trend. The direction of change in an attribute as observed over time.*

Utilization is the proportion or degree of the current year's forage production that is consumed or destroyed by animals (including insects). The term may refer either to a single plant species, a group of species, or to the vegetation community as a whole. Interagency Technical Reference 1734-3, page 133.

* Definition from “A Glossary of Terms Used in Range Management.” Fourth Edition, edited by the Glossary Update Task Group, Society for Range Management, Thomas E. Bedell, Chairman. 1998. Second Printing 2003.

Additional Definitions

Seasonal grazing: grazing restricted to one or more specific seasons of the year (Holecheck et al. 2004).

Yearlong grazing: continuous grazing for a calendar year (Holechek et al. 2004).

Managed grazing: implementing a grazing system to accomplish specific management objectives. Can include:

- Continuous grazing- grazing a particular pasture or area the entire year, including dormant season
- Deferment- a period of nongrazing during part of the growing season
- Grazing system- planned effort by rangeland managers to leave some grazing areas unused for at least part of the year
- Rest- distinguished from deferment in that nonuse occurs for twelve consecutive months rather than just part of the growing season
- Rotation- scheduled movement of grazing animals from one pasture to another
- Season-long- grazing a particular area or pasture for an entire growing season (Howery et al. 2000)

Appendix F - 2011 Watershed Condition Classification Summary

In 2010, a national effort was launched to assess the condition of all 6th code watersheds on Forest Service land. Twelve attributes were assessed. Attributes that may be affected by this project are: Water Quality, Water Quantity Condition, Aquatic Habitat Condition, Aquatic Biota Condition, Riparian/Wetland Vegetation Condition, Soil Condition Fire Effects and Regime, Forest Cover, Rangeland, and Terrestrial Invasive Species. The results of the assessment for the 6th code watersheds in the project area are listed below (USDA 2010).

Sixth-code watersheds and condition

Table 34: Sixth-code watersheds and their condition

6 th Code Watershed	Condition
Cienega Creek-Salt River	Impaired
Tanks Canyon	Functioning at risk
Upper Sycamore Creek	Functioning
Rock Canyon-Salt River	Functioning at risk
Ash Creek	Functioning at risk
Butte Creek-Salt River	Functioning at risk
Hess Canyon	Impaired
Upper Sevenmile Wash	Functioning at risk
Yankee Joe Canyon-Salt River	Functioning at risk
Sycamore Canyon-Salt River	Functioning at risk
Horseshoe Bend Wash	Impaired
Shute Springs Creek-Salt River	Functioning at risk
Coon Creek	Functioning at risk
Chalk Creek	Functioning at risk
Griffin Wash	Functioning at risk
Meddler Wash-Salt River	Functioning at risk
Lower Pinto Creek	Functioning at risk
Lower Pinal Creek	Impaired
Middle Pinal Creek	Impaired
Cooper Forks-Cherry Creek	Functioning at risk
Reynold's Creek	Functioning at risk

U.S.D.A. Forest Service 2012, [Watershed Classification and Assessment Tracking Tool 1.2](#)

Appendix G - Public Comment Analysis (Scoping)

Salt River Allotments Vegetative Management EIS

Summary of Scoping Comments

Table 35: Summary of Scoping Comments with Forest Service response

Action/Concern	Response	Letter #
Salt River		
Opposed to or request to eliminate grazing along the Salt River	Covered in no grazing alternative, current management alternative for TBRD	1.1, 10.4, 19.1, 25.1
Manage grazing along the Salt to remove more vegetation to improve flow	Not supported by science	14.1
Limit grazing along the Salt River	Current mgt. for Dagger and Poison Springs already limits this- if the same is true for Globe allotments then this is covered under our current management alternative	13.1, 33.1
Use domestic goats to graze along the river to remove tamarisk	Not an issue- only a suggestion already covered by tools we identified- should have biologists address this in their environmental consequences	3.1
Eliminate tamarisk along the Salt and replace with native vegetation	Patti? Wildlife biologists?	14.2
Recreation		
Grazing activities are inconsistent with the pristine wilderness of the Salt River canyon and severely detract from the enjoyment of travel through the corridor	In Salt River Wilderness plan	17.2
One cow will do more damage than any raft trip. We have had to camp in cow manure which I guess if ok, but we have to care out human waste. Why is there never any common sense applied to use of our resources? You limit human interaction but allow other actions that are much more damaging.	Recreation Alternative	4.1
Conflicts between recreational users and cattle have existed in the recent past. The draft EIS should evaluate the impacts of cattle on recreation and consider eliminating cattle from these areas to benefit the resources and to address conflicts with recreational users.	Recreation Alternative	22.6
"I have only been boating the salt since 1988. That was before any fees were required and there was not a lottery."	Will be covered in DEIS	26.1

Appendix G: Public Comment Analysis (Scoping)

Action/Concern	Response	Letter #
(need to address economics of recreation)		
Riparian Areas		
Opposed to or request to eliminate livestock grazing in riparian areas	Covered under current mgt. for TBRD; also mitigated through forest monitoring guidelines	8.2, 22
Request reconsideration of your district's decision to support reauthorization livestock grazing. At least in areas where drainages affect the quality of streams and creeks that flow into the Salt. Such as Cherry Creek	Cherry Ck. And Coon Ck. Already covered under current mgt.	17.1
Identify every perennial riparian area on these allotments, and describe their current ecological conditions. Also, please include livestock management measures in your proposed actions specifically designed to protect these riparian areas from livestock grazing.	Will be covered	20.3
If you are going to propose strategies wherein new livestock waters on the uplands will supposedly attract cattle from the riparian areas in sufficient numbers to protect the riparian areas from cattle damage, please provide examples of where this technique has actually worked in the Desert Southwest.	Covered in Range report	20.4
Ensure that small native trees and seedlings will be protected from the cattle, fire management and salt cedar encroachment to allow them to reach maturity	Covered in forest riparian monitoring guidelines for grazing; no prescribed burning in riparian areas.	14.2
Develop a large scale phased project starting at the headwaters to gradually remove the salt cedars and replace them with native trees.	Being addressed in Weeds EA	14.3
Include information about how well these permittees have complied with existing riparian grazing restrictions over the last several years.	TBRD can do this for current permittees- they have not been allowed to graze the creeks	20.5
Many streams that are either perennial or ephemeral in nature may require some type of management prescription to protect their riparian resources. In working upstream along the Salt River and starting with the Hicks-Pikes Peak Allotment, there is Pinal Creek, Shute Springs Creek, Nail Creek, Redmond Wash, Chalk Creek, Cook Creek, Mud Springs Wash, Sycamore Canyon, Grapevine Canyon, Storm Canyon, Cherry Creek, Black Jack wash, Lower Corral Canyon, Yankee Joe Canyon, Hess Canyon, Butte Creek, Ash Creek, Walnut Canyon, and Regal Canyon. There are numerous other unnamed drainages that have riparian values that	Riparian Alternative	22.5

Action/Concern	Response	Letter #
are part of the Salt River drainage system, such as the drainage that joins the Salt River at Quartzite Falls. Gila River watershed captures Seven Mile Wash, Cammerman Wash and a number of their tributaries. Consider construction of fences and/or designate certain pastures as closed to grazing to protect riparian areas from livestock grazing. Descriptions of the upland conditions for each of the listed creeks will need to be provided. Relevant data, such as photo points, surveys for riparian conditions, stream flow data, and other studies should be included.		
Livestock Grazing		
Reduce/eliminate grazing from FS lands, watersheds	No Action Alternative	2.1, 8.3, 10.2, 12.1, 17
Opposed to or eliminate grazing in wilderness areas	Federally mandated opportunity	13.2, 17.2, 25.2,
Remove improvements in poor condition at permittees expense; remove existing livestock	Covered in Range Report	10.3
Concerns about impacts from improvements	Addressed through NEPA analysis and heritage surveys prior to implementation	
It is a poor idea to permit livestock grazing during the hot season in the desert. Are you planning to permit hot season grazing where it is currently prohibited?	Sonoran Desert lands are identified as suitable for grazing under forest plan	20.1
When determining stocking levels and pasture rotation schemes you need to recognize that the Sonoran Desert has a very low tolerance for grazing and that the landscape and its plants are not adapted to extensive grazing. Our second concern with the upper limit of 800 animals per permittee is there has been some discussion about the permittees considering a grazing strategy that uses a larger number of cattle that graze small pastures intensely for short periods of time. This is something that has been advocated by Alan Savory. We would like to note that the methodology and science behind the Savory method of grazing is predicated on a high level of precipitation (or irrigation) accompanied by a low level, or complete absence of nutrients in the soil. Soil types in this area are derived from the breakdown of limestone, quartzite, shale, and conglomerates as well as schist and granite with some tertiary volcanics. This should give the area a soil type that has a fairly high nutrient value as	General comment; will be addressing management strategies in document Adaptive Management through AOIs PA reworded to remove 800 number	22.10

Appendix G: Public Comment Analysis (Scoping)

Action/Concern	Response	Letter #
opposed to a soil type that is derived from, for instance, sandstone formations. This type of grazing is extremely inappropriate for these Sonoran Desert lands and overall for Arizona, which does not receive adequate rainfall to support this type of scheme or any intensive livestock grazing		
The EIS must explain how grazing will function as an ecosystem tool and on what peer-reviewed science is it based	General comment; will be addressed in DEIS	22.13
You are proposing to permit up to 800 head of livestock per grazing permittee. This is a violation of your forest plan, which says that permitted cattle numbers must be derived from the specific ability of the each allotment to support them. Each of these allotments is unique, so their permitted number must be unique too.	Will be addressed through adaptive management	20.2
The proposal to allow a maximum of 800 head of cattle per grazing permittee raises many concerns. The first is, if an allotment has four permittees, such as the Hicks Pike Peak allotment, would this mean that the upper limit on the number of cattle for this allotment is 3,200 head? The draft EIS must explain how this number of 800 was derived, why it is considered appropriate by the Forest Service, and an evaluation of the environmental impacts associated with allowing 800 animals per allotment must be included. We ask that the Forest Service evaluate an alternative with a much lower number per allotment and much appropriate to the vegetation, rainfall, etc.	Will be addressed through adaptive management	22.1
Permitted numbers and actual stocking numbers should have been included as part of the scoping letter and should be listed for each allotment in the draft EIS, so the public can better understand and evaluate this proposal. A map should also have been included for a project of this scope. When this EIS is written there should be a detailed map showing the pastures in each allotment and the acreage of each allotment. In order for the public to really evaluate this and to assess whether the Forest Service has adequately evaluated the impacts and alternatives, the draft EIS must include more detailed information on stocking levels for the Dagger and Poison Springs/Sierra Ancha allotments as well.	Will be addressed through analysis	22.2
Require permittees to retain 50 percent of EQIP funds held in reserve and used for monitoring the resource as part of the EIS. If EQIP funds are used to construct new grazing infrastructure and/or if old grazing infrastructure is in need of repair, we ask that this be done for improving and conserving the resources and not to	Outside scope	22.3

Action/Concern	Response	Letter #
increase the current stocking levels.		
EIS should include monitoring process for each allotment, frequency of monitoring and monitoring techniques. Monitoring must occur throughout the life of these permits	Monitoring will be described in document	22.4
Wants to know about current condition of allotments	Will be described in document	5.1
Who will conduct the monitoring you will no doubt propose? Will it be the rancher? Will you also include a copy of the sheet he will be completing? Will you address the issue that it may not be in the best interests of the rancher to self-report failure to meet standards? Will you address how the conditions of the landscape declined in the past without the Forest Service taking any steps to reverse them?	General comments; monitoring will be described in document	27.4
Please also address the recent findings relating to livestock and e.coli in water.	Water quality covered in DEIS. No history of e-coli on these allotments	27.5
Hicks-Pikes Peak allotment pastures exist on both sides of the river and it seems reasonable that the permittee should be able to move his or her cattle onto pastures on either side of the river from time to time. This draft EIS needs to explain how cattle will be moved from pasture to pasture on this allotment. What points along the Salt River, if any, are being used as cattle crossings?	Covered in Range Report	22.9
The Chrysotile allotment has a history of very poor grazing practices. Please refer to <i>Freedom of Information Act</i> request, Control Number TON-2004-022 (June 2004), for details on this allotment. Has this allotment been rested to allow for a recovery from past grazing? What is the condition of the allotment currently? If it continues to be poor, the draft EIS should evaluate resting certain pastures and perhaps indefinitely given the past grazing history.	Will be discussed in the document (Ernie will look up FOIA)	22.11
Fire		
No burning in wilderness areas	General comment; addressed through existing policy	13.2
Contact and coordinate with SRP's Electric System Operation and Maintenance Division to discuss issues that relate to prescribed burning and wildfire activities to better analyze and plan for minimizing the risk of outages caused by smoke generated from fire(s).	Addressed by Fire/Air staff.	15.1, 16.1, 28.1
Opposed to prescribed burning	General comment	2.1
Support aggressive action against invasive species and		8.1

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Action/Concern	Response	Letter #
thinning wildfire fuels		
Your letter states that current practices in the area are not meeting Forest Plan Standards; then later it states that grazing would “continue” to meet the Forest Plan. Your letter states that “Past management practices, such as suppression of wildland fires are limited and have not always proven effective.” I don't know what that sentence means -- do you mean that there has not been enough fire suppression and what there was not effective?	Covered in fire report	27.1
Utility vegetation management and objectives within existing permitted energy corridors should be integrated into the planning process and EIS analysis. SRP, and other power utilities, must manage vegetation under existing and future transmission lines and within corridors to meet the North American Electric Reliability Corporation (“NERC”) and Federal Energy Regulatory Commission (“FERC”) standards. Generally, these standards require maintaining low growing species within the corridor to prevent electric arching, wildfire, and the potential for outages. Transmission lines, typically cleared of most trees, may also serve as fuel breaks, and line maintenance roads that are typically closed to the public can be used by the Forest crews in fighting fires. The Tonto NF was one of several National Forests in Arizona that cooperated with multiple utilities to meet Section 7 requirements of the <i>Endangered Species Act</i> to cover vegetation management activities along these lines. The Biological Opinion ¹ resulting from that consultation, and the associated US Forest Service Biological Assessment, contains extensive information on powerline corridor vegetation conditions and required utility maintenance actions in the proposed project area. We suggest that the Tonto NF utilize these resources in the EIS when analyzing the effects of the proposed project. U.S. Fish and Wildlife Service Biological Opinion “Phase II Utility Maintenance in Utility Corridors on Arizona Forests. July 17, 2008. AESO/SE: 22410-2007-F-0365.	Covered in fire report	28.2
Prescribed fire should not be used as a tool to facilitate larger stocking rates on these allotments, but should only be used to bring damaged ecosystems back into a more	Covered in fire report	22.14

Action/Concern	Response	Letter #
<p>natural condition. Wildfires that do not pose a risk to public safety and where appropriate should be allowed to burn in the allotments covered in this scoping letter.</p> <p>We would like to see a detailed discussion in the draft EIS on how wildfire, as well as prescribed fire, will play a role in grazing strategies for this area and in restoring more natural conditions. The draft EIS must also consider the ecosystem values of the pinyon-juniper ecosystem and the most recent information on it.</p>		
Fish/Wildlife		
<p>Impacts of grazing on the opportunity for native fish recovery should also be considered in the draft EIS. Ash Creek has been proposed as a relocation area for Arizona native fishes. Cattle should be fenced out of this area and new efforts made to introduce native fishes into this drainage. The reach of Ash Creek in question would be from the downstream private property boundary at Chrysotile down to the confluence with the Salt River. This draft EIS should consider the impacts of these allotments and livestock grazing on the important recovery of native fishes and the potential for recovery in areas such as Ash Creek</p>	Covered in Fish report	22.7
<p>Gila Monsters are frequently encountered in the sandy soils along the river in which they dig their burrows. Swallows build thousands of nests each year along the river and a number of different bat species are known to inhabit this wilderness area. The draft EIS must address the detrimental impacts of livestock grazing relative to these species as well as ways those impacts will be mitigated.</p>	Covered in wildlife report	22.8
<p>SRP suggests that the Tonto NF fully analyze impacts of proposed activities on species covered in SRP's HCP/ITP and their habitat, especially in those grazing allotments that border Roosevelt Lake, the Salt River near Roosevelt Lake and in areas where these species may disperse when lake levels are high. In the Biological Opinion issued for SRP's ITP, FWS concluded that, at a minimum, an estimated 50 to 100 acres of occupied habitat would continue to persist and be maintained at the upstream ends of the lake along the Tonto Creek and Salt River deltas as part of on-going reservoir operations. In addition, Roosevelt Lake is expected to support the minimum number of territories, in most years, in the Roosevelt Management Unit of the Gila Recovery Unit</p>	Will be covered in DEIS	28.4

Appendix G: Public Comment Analysis (Scoping)

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<p>needed for reclassification of the species to threatened status.² We recommend that the amount of habitat that was expected to remain viable be incorporated into the baseline of the Tonto NF's project analysis. Furthermore, as required by the Bureau of Reclamation and USDA Forest Service Agreement³, and the subsequent Tri-Party Agreement, any potential effects of the proposed project on reservoir operations due to impacts on the current or future availability of covered species habitat as described in the HCP would need to be fully considered to assure no operational impacts would occur.</p> <p>²Memo from the Acting Field Supervisor, Arizona Ecological Services Office, Phoenix, AZ to the Regional Director, Fish and Wildlife Service, Albuquerque, NM regarding Intra-Service Biological and Conference Opinion – Issuance of a Section 10(a)(1)(B) permit to Salt River Project for Operation of Roosevelt Lake, February 21, 2003.</p> <p>³ 1987 Master Interagency Agreement between the USDI Bureau of Reclamation and the USDA Forest Service, titled “Concerning Water Resource Related Projects of the Bureau of Reclamation Within or Adjacent to National Forest System Lands” and the supplemental Management Memorandum among the Salt River Project Agricultural Improvement and Power District, United States Department of Agriculture Forest Service and United States Bureau of Reclamation (also known as the “Tri-Party Agreement”).</p>		
<p>AZGFD recommends the EIS clearly define specific objectives and treatment alternatives that strive to maintain and/or improve all available natural resources (watersheds, soils, wildlife habitat/plant communities, wildlife populations, timber, range) while promoting natural fire regimes and utilization of range resources for livestock. The analysis should consider the following: Development of a range of objectives for each resource Development of a range of alternatives to achieve objectives for each resource Development of a proposed action and alternatives that adequately describe the location and extent where it is suitable for each tool to be applied. An analytic and scientific evaluation of the suitability of</p>	<p>General comments</p> <p>To be addressed</p>	

Action/Concern	Response	Letter #
<p>each tool to achieve desired ecological conditions for each resource within the scope of the Environmental Consequences chapter (define the area or habitat type or other spatial description of what portions of the analysis area will be suitable for what types of tools)</p> <p>Development of mitigation measures for each tool if they are determined to have direct or indirect effects on each resource.</p> <p>Link existing conditions (chapter 3) with the environmental consequences of each tool in an easy to follow matrix in chapter 4.</p> <p>The Department believes the scope of the EIS should include development of resource objectives that address the following wildlife habitat concerns and potential management opportunities. We believe grazing and fire management may have the potential to directly and indirectly effect wildlife resources in both positive and negative ways.</p> <p>*See letter for General habitat/wildlife management concerns; habitat management opportunities that would benefit wildlife; special status species.</p> <p>We believe in order to be successful under an adaptive management approach, it would be necessary to be collaborative in the development of resource objectives and strategies, ensure transparent process and use a scientifically based approach that is reliable and defensible for measuring success, and comprehensive in addressing all ecosystem functions and values. We recommend the EIS clearly articulate goals, objectives, strategies, monitoring methods and strategies, measures of success, and adaptive management processes and procedures, in a way that is easy to understand by the general public and not buried by reference to other Forest handbooks, manuals and planning documents.</p>		
NEPA		
<p>The purpose of the action must be to move ecosystems toward their desired conditions, not to “authorize livestock grazing in a manner consistent with Forest Plan direction to move ecosystems towards their desired conditions.”</p>	General comment	10.1
<p>Please tell me how your current authority prevents you from altering stocking rates, doing whatever it is you mean by “vegetation manipulation,” and building water developments. I receive small documents authorizing water developments all the time from the Tonto NF. I note that stocking rates vary annually on most allotments. What is so new about your plan?</p>	General comment	27.3

Appendix G: Public Comment Analysis (Scoping)

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The “new” tools you identify are: livestock grazing, prescribed fire, managed wildland fire, herbicide application, mechanical vegetative removal, and seeding. How are those new?	General comment	27.2
This draft EIS should consider the impacts of climate change and prolonged drought and use this to adjust stocking levels and address mitigation measures.	Climate will be addressed	22.12
<p>AZGFD recommends the EIS clearly define specific objectives and treatment alternatives that strive to maintain and/or improve all available natural resources (watersheds, soils, wildlife habitat/plant communities, wildlife populations, timber, range) while promoting natural fire regimes and utilization of range resources for livestock. The analysis should consider the following:</p> <p>Development of a range of objectives for each resource</p> <p>Development of a range of alternatives to achieve objectives for each resource</p> <p>Development of a proposed action and alternatives that adequately describe the location and extent where it is suitable for each tool to be applied.</p> <p>An analytic and scientific evaluation of the suitability of each tool to achieve desired ecological conditions for each resource within the scope of the Environmental Consequences chapter (define the area or habitat type or other spatial description of what portions of the analysis area will be suitable for what types of tools)</p> <p>Development of mitigation measures for each tool if they are determined to have direct or indirect effects on each resource.</p> <p>Link existing conditions (chapter 3) with the environmental consequences of each tool in an easy to follow matrix in chapter 4.</p> <p>The Department believes the scope of the EIS should include development of resource objectives that address the following wildlife habitat concerns and potential management opportunities. We believe grazing and fire management may have the potential to directly and indirectly effect wildlife resources in both positive and negative ways.</p> <p>*See letter for General habitat/wildlife management concerns; habitat management opportunities that would benefit wildlife; special status species.</p> <p>We believe in order to be successful under an adaptive management approach, it would be necessary to be collaborative I the development of resource objectives and strategies, ensure transparent process and use a scientifically based approach that is reliable and</p>	<p>Mostly general comments that will be addressed already through the development of the EIS. Biologists will be addressing the wildlife concerns through existing condition reports, MIS lists, and BAs.</p>	24

Action/Concern	Response	Letter #
defensible for measuring success, and comprehensive in addressing all ecosystem functions and values. We recommend the EIS clearly articulate goals, objectives, strategies, monitoring methods and strategies, measures of success, and adaptive management processes and procedures, in a way that is easy to understand by the general public and not buried by reference to other Forest handbooks, manuals and planning documents.		
Heritage		
Monitor all ground disturbing activities for archeological sites. Avoid impacts to sites; cease activity where sites present; inform authorities of damage	Covered in heritage report	7.1
Address protection of archaeological sites	Covered in heritage report	10.5
Air Quality		
Two allotments in maintenance plan area for sulfur dioxide. Disturbance of fine particulate matter is anticipated during construction phase and fire management. Follow state air quality laws.	Covered in fire report	18.1
Invasive Species		
Consider herbicides only as a last resort option. The toxicity of herbicides to the wildlife and surrounding vegetation should be noted. If used, we request that the area be clearly posted along with potential side effects, and local communities and adjacent land owners be notified of planned use.	Covered in weeds report	23.1
Livestock help to spread invasive and other non-native plants. This draft EIS should look at the impacts of livestock spreading these plants and seek to minimize and mitigate the impacts of the spread of non-native invasive species.	Covered in weeds report	22.15
Regarding references to herbicide application, mechanical vegetative removal, and seeding. Please explain in detail in the draft EIS how these three concepts will be used in your grazing strategies for this area and how they will affect the native vegetation and wildlife, human health, and the long-term health of the land.	Covered in weeds report	22.16
Other		
Wants to be kept informed	General comment	6, 11, 21

Appendix G: Public Comment Analysis (Scoping)

Action/Concern	Response	Letter #
<p>The Tonto NF, from its inception in 1905, has had a mandate to protect the headwaters of the many important tributaries of the Salt River.⁴ In fact, the Department of Agriculture made the request to include forested lands in this watershed “in fact entirely, for the protection of the Roosevelt Reclamation Project.”⁵ The Reclamation Service also wanted lands set aside in the Tonto NF to protect important parts of the Salt River drainage for the Salt River Project.⁶</p> <p>The EIS should recognize the historical purpose of the Tonto NF to protect the watershed and water supply for the Salt River Valley, and that the proposed project is in line with those goals.</p> <p>Activities related to improving water supplies or water yields, such as spring and well development, should be analyzed taking into account all applicable state laws regarding water rights. Specifically, the EIS should address the source of water, applicable water rights that will be utilized, the conveyance mechanism to utilize those rights, other affected water rights holders and water users, and, as appropriate, coordination with the Arizona Department of Water Resources.</p> <p>We recommend that the evaluation process emphasize the current full appropriation of surface water flows, the importance of maintaining existing instream flows, and discourage new surface water diversions and/or groundwater withdrawals on the Forest.</p> <p>⁴ A.E. Cohoon, “The Proposed Tonto Forest Reserve Arizona.” USDA Bureau of Forestry, 1905</p> <p>⁵ Department of Agriculture: Letter from B. T. Galloway, Acting Secretary of Agriculture to Secretary of the Interior, August 30, 1913.</p> <p>⁶ U.S. Reclamation Service: Memo from the Office of the Director, USRS to First Assistant Secretary, November 11, 1913</p>	<p>Will be covered in the hydrologist report. History of the forest is out of the scope of this document.</p>	28.3
<p>I hope you notice the fire dangers that over-grazing creates. This is not good for trees and plants. There is a pattern building again with drought conditions appearing every 10 years approx. Think about how many trees AZ</p>	<p>General comment</p>	26.2

Action/Concern	Response	Letter #
has lost recently, in time no trees just creates more dessert and almost no rain. Cattle farmers need to do it differently . . .		
I KNOW THE FOREST SERVICE USUALLY SPRAYS CYANIDE TO STOP FOREST FIRES. ARE THEY STILL DOING THAT? OR DID THEY FINALLY CUT OUT THE CUYANIDE. SETTING PLANNED FOREST FIRES RELEASE MERCURY - WHICH IS NOT HEALTHY FOR PEOPLE OR ANIMALS OR BIRDS. . . .	General comment	2

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